California. Dept. of Fish and Game.
Biennial Report 1930-1932.
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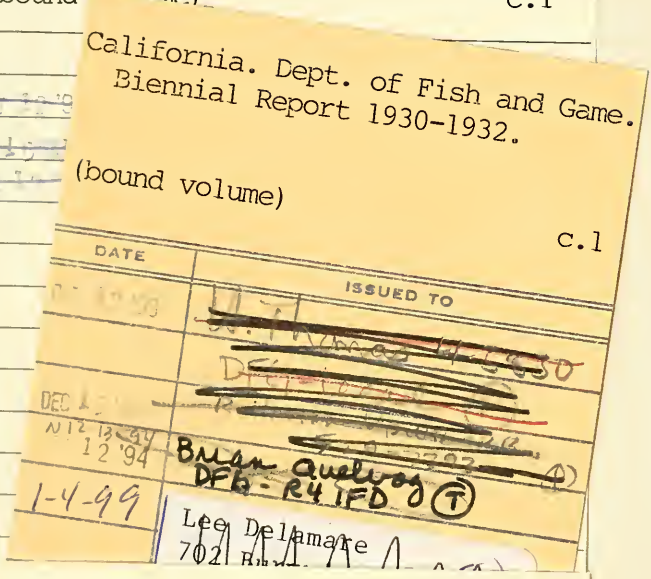
# BIENNIAL REPORT
OF THE
# DIVISION OF FISH AND GAME
OF CALIFORNIA

1930-1932

California. Dept. of Fish and Game.
Biennial Report 1930-1932.

(bound volume) c.1

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STATE OF CALIFORNIA

DEPARTMENT OF NATURAL RESOURCES

# Division of Fish and Game

## THIRTY-SECOND BIENNIAL REPORT

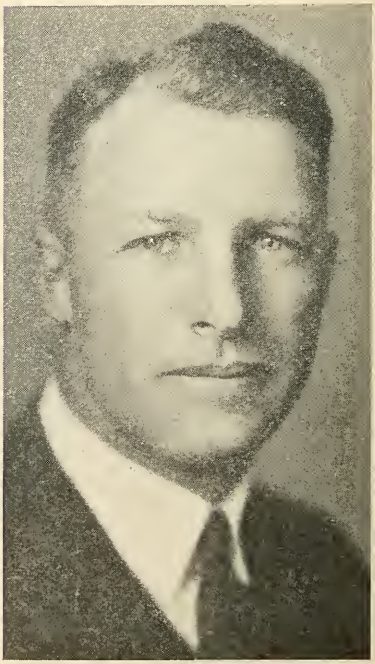
For the Years 1930-1932

97533

J. Dale Gentry, President, State Fish and Game Commission.

Earl B. Gilmore, Fish and Game Commissioner.

I. Zellerbach, Fish and Game Commissioner.



John L. Farley, Executive Officer.

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## LETTER OF TRANSMITTAL

San Francisco, September 14, 1932.

*His Excellency* James Rolph, Jr.,
*Governor, State of California,*
*Sacramento, California.*

Sir:

In compliance with law we submit herewith a report of the activities and accomplishments of the Division of Fish and Game for the biennial period from July 1, 1930, to June 30, 1932.

This report contains a brief summary by the executive officer, followed by detailed reports by the chiefs of the several bureaus of the division and a complete statistical report.

Your excellency has been most considerate and helpful in the work of this Division. Your staff, the members of the Legislature, and the officers of the several departments of the State government have all joined to help make our work pleasant and effective. We wish to express our appreciation for this assistance.

Respectfully submitted.

J. Dale Gentry,
I. Zellerbach,
Earl B. Gilmore,

Fish and Game Commission.

## IN MEMORIAM

It is with much regret the division reports the following deaths among its staff during the biennium and wishes at this time again to give recognition to the faithful and efficient service rendered by these men.

| | *Entered service* | *Died* |
|---|---|---|
| I. L. Koppel | August 1, 1909 | November 5, 1930 |
| Rupert J. Sadler | December 26, 1924 | January 21, 1931 |
| Clarence A. Nixon | March 1, 1910 | February 13, 1931 |
| Harry I. Pritchard | May 1, 1903 | April 3, 1931 |
| G. H. Lambson | March 1, 1916 | June 1, 1931 |
| A. E. Culver | July 1, 1913 | September 28, 1931 |
| George A. Coleman | August 1, 1924 | April 28, 1932 |

# THIRTY-SECOND BIENNIAL REPORT

## REPORT OF THE EXECUTIVE OFFICER, JOHN L. FARLEY

At the beginning of the biennium the membership of the Fish and Game Commission was: I. Zellerbach, San Francisco, President, and R. Fernald of Santa Barbara. On August 18, 1930, C. R. Bell qualified as a member to fill the existing vacancy. The resignation of R. Fernald as commissioner was accepted by the Governor early in January, 1931. The vacancy thus created remained unfilled until after C. R. Bell resigned during the following December when J. Dale Gentry of San Bernardino and E. B. Gilmore of Los Angeles were appointed as members of the Commission. On January 8, 1932, the Commission met and reorganized with J. Dale Gentry as president and I. Zellerbach and E. B. Gilmore as members. Thus organized, the Commission continued its work through the remainder of the biennium, holding frequent meetings in widely scattered communities of the State to give full opportunity for sportsmen and commercial fishermen to meet with the Commission in the discussion of their problems.

There have been but few changes in the administrative personnel. On July 1, 1930, Leo K. Wilson, formerly publicist for the Division, became chief of the Bureau of Education and Research. On November 1, 1931, W. H. Shebley was transferred from chief of the Bureau of Fish Culture to become fish cultural advisor to the Commission. Dr. J. O. Snyder of Stanford University, for many years consultant and part-time worker on fishery problems, was appointed to fill the vacancy. Opie Warner was appointed as publicist on March 1, 1932, following the resignation of Earl Soto.

During the past biennium there have been no radical departures from the policies which had been in effect previously. Constant effort has been made to improve methods of game and fish production, to reduce costs and to secure hardy stock which will survive when properly released. Our game farm work, particularly our advancement in the use of electric incubators and brooders, has received national recognition.

Among the accomplishments during the past two years may be listed the purchase and development of three more migratory waterfowl refuges; substantial additions and improvements to our hatcheries and pond systems; the construction of bass ponds; the installation of mechanical statistical equipment in the commercial fisheries laboratory and better management of our game refuges.

### LICENSE SALES

The work of the Division is supported entirely from funds derived from the sale of licenses and deer tags, revenue derived from commercial fishing operations, and fines for fish and game law violations.

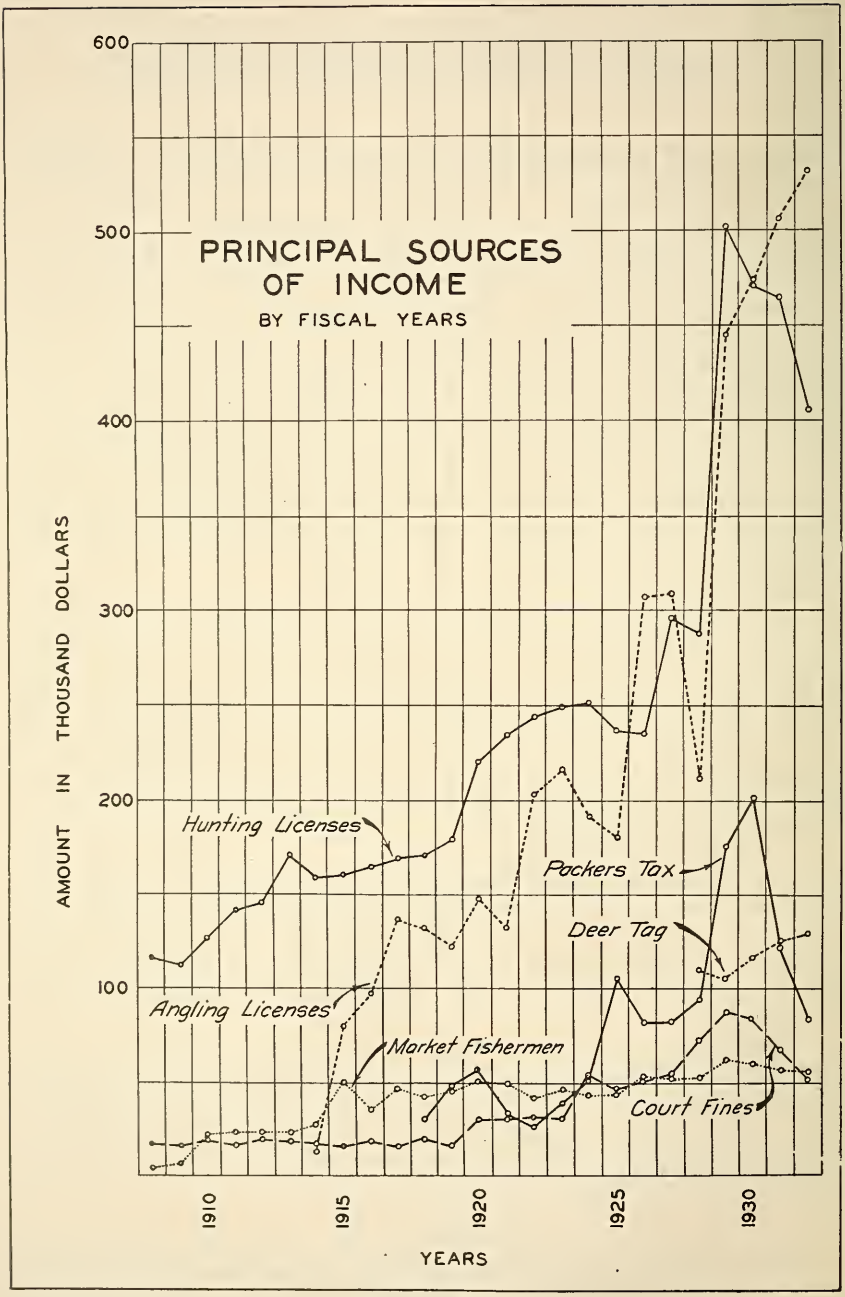
PRINCIPAL SOURCES
OF INCOME
BY FISCAL YEARS
AMOUNT IN THOUSAND DOLLARS
600
500
400
300
200
100
Hunting Licenses
Packers Tax
Deer Tag
Angling Licenses
Market Fishermen
Court Fines
1910
1915
1920
1925
1930
YEARS

FIGURE 1.

This being the case, it is of particular interest to observe the trend of these sources of income. The accompanying chart shows clearly what is taking place. (Fig. 1.) The consistent increase in angling license revenue and deer tag sales is most gratifying, but the marked falling off in hunting license sales, fish packers tax, and court fines has made necessary careful management to avoid the necessity of abandoning valuable work, and has emphasized the value of maintaining a reasonable reserve in our funds.

The drop in hunting license sales reflects the economic depression and the short migratory waterfowl season of 1931. Judges have

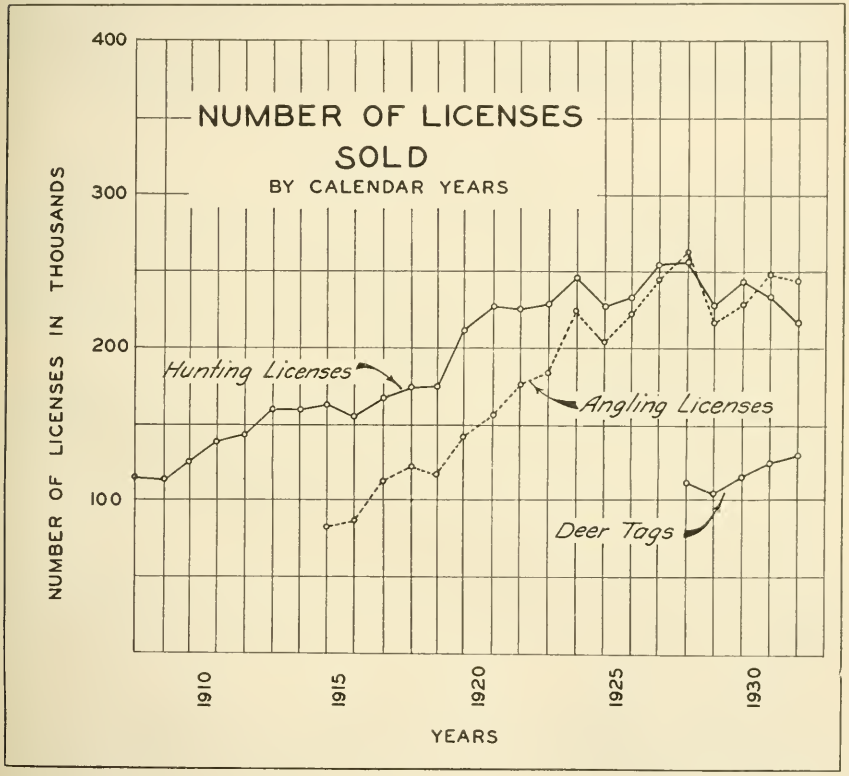


FIGURE 2.

been more lenient in their fines and a poor market for canned fish has resulted in a drastic reduction in revenue, particularly from the sardine industry.

Figure 2 shows the number of hunting and angling licenses, and deer tags sold. The apparent inconsistency between the two charts in the case of angling licenses is due to insistence for prompt settlement of accounts during the last year. This resulted in larger collections in spite of reduced sales.

The total income for the 82d fiscal year was $1,359,111 and for the 83d fiscal year was $1,278,148. The expenditures for these two periods were $1,370,690 and $1,379,649 respectively.

The last Legislature provided a means of distributing licenses on credit with a reduced commission to dealers obtaining credit, and provisions for proper bonding to insure the State against loss. This change was made necessary by the gradual withdrawal of county clerks from the distribution of licenses. Many of these clerks carried the accounts of their agents, many of whom could not, or did not care to pay cash for their licenses. Sportsmen should find it easy to buy licenses and this is only possible with a wide distribution of agents. The new system, in conjunction with the old, seems to be working satisfactorily although it has necessitated a slightly added force in our license office to take care of the greatly increased mail order business. The added expense for bonding and labor is saved in the reduced commission allowed on credit sales. License commissions (5 per cent for cash and 2½ per cent for credit) are paid only to agents other than employees of the commission and amount to over $50,000 a year.

## BUREAU OF PATROL

The Bureau of Patrol is the largest subdivision of the Commission's work, and while organized primarily for the enforcement of fish and game laws, this bureau assists in practically all phases of our conservation work. This bureau, in cooperation with the Bureau of Fish Culture, is responsible for the planting of fish from our hatcheries, and a splendid new fish planting truck with aerating equipment is being delivered for this season's work.

During the 1931 fire season, fish and game wardens and equipment were assigned to the State Forester to assist in fire control and suppression, and they are always on call for emergency work of this kind. The U. S. Forest Service and the National Park Service have cooperated in a most effective manner in the planting of fish and in the enforcement of our game laws.

The short duck season established by the Federal Government in 1931 brought problems of law enforcement, but the sportsmen of the State responded most generously in recognizing the existence of an emergency, and in cooperating in the enforcement and observance of Federal regulations.

Metal, self-locking seals are being provided for the 1932 deer tags. Many complaints have been received because the old tags are easily torn off, removed and dates altered. The metal seal should overcome some of the defects of the old tags and may be of some assistance in law enforcement.

Game wardens assist in the control of predators and vermin which are destructive to our desirable wild life. The stray house cat is a serious problem and a menace to our game birds. Misdirected sympathy for these animals results in their abandonment in out of the way places where they can only live at the expense of our wild life.

Our volunteer deputies have been particularly active in the creation of quail sanctuaries and in the control of the enemies of the quail. Six hundred thousand acres with an estimated quail population of 400,000 birds have been secured as quail sanctuaries by this group. These sanctuaries are being surveyed to determine their value, and assistance is being given in the development of the more useful areas.

The volunteer deputies have held annual state-wide conventions without cost to the State, the entire expense being borne by these workers.

## FISH CULTURE

The Bureau of Fish Culture has operated 25 hatcheries, two tank stations, 30 egg-taking stations and 78 brood and aging ponds from which nearly 68,000,000 trout and over 9,000,000 salmon have been planted during the biennium. The problem of egg supply is receiving a great deal of attention. Sixty-two million eggs were collected from wild fish in the State, 22,000,000 were secured from our own brood ponds and nearly 17,000,000 were purchased. There is great danger of infecting our hatcheries and streams with fish diseases from imported eggs, so the desirability of developing a source of supply from within the State and entirely under the control of the Commission is apparent.

The program of raising fish to larger sizes has been continued, and during the biennium 390,000 trout ranging from 5 to 9 inches in length were planted from our rearing ponds.

Planting methods are being carefully studied in order to make this work more effective. As noted above, this is a joint responsibility between the Bureau of Patrol and the Bureau of Fish Culture, and a field representative of the latter bureau has been designated to coordinate the work in the two divisions. To further insure the best possible distribution of fish, allotments of fish will not be made without the approval of the captain of wardens of the district concerned.

In the early spring of 1932, small mouth bass ponds were constructed near Friant. Brood fish were secured through the efforts of sportsmen and our own representatives, but the ponds were completed too late to secure a crop of these fish this year. To thoroughly test out the new bonds, several thousand bass fingerlings from wild fish were seined and transferred to the Friant ponds. Daphnia ponds to provide food for the smaller bass have been developed, and other ponds designed to raise quantities of small fish for food for the larger bass have been in successful operation. The value of these experimental ponds will be determined in the spring of 1933 when the mature fish spawn. The propagation of bass is a much more complicated problem than is the case with trout. The eggs can not be taken artificially, and the bass require live food exclusively.

A cooperative trout investigation has been undertaken by the U. S. Bureau of Fisheries and the Fish and Game Commission to determine a proper State policy and program for the hatching, rearing, distribution and protection of the trout of our State. A brief outline of this work follows the report of the Bureau of Fish Culture.

## COMMERCIAL FISHERIES

In contrast with our last report which recorded an increase of 62 per cent in the commercial catch of fish, we must now record a decrease of 21 per cent in the amount of fish and shellfish landed during the past biennium. The sardine landings decreased from 1,072,000,000 pounds in the previous period to 795,301,000 pounds during the past two years. This is due to market conditions rather than a decrease in abundance, but continued studies were carried on to determine the

amount of effort required to take the various important commercial fishes.

Investigations have been made on the efficiency of various types of nets and gear used, and with the assistance of the U. S. Bureau of Fisheries, considerable productive work has been done in the development of the oyster industry, particularly in the Humboldt Bay region. Salmon studies have continued, and important work done on the white sea bass, barracuda, striped bass and the life history of sardines. The commercial fisheries laboratory also issued a handbook on commercial and game fishes of the State which has been unusually well received.

The gathering and analyses of statistics on the commercial fishes has continued, and the work strengthened by the registration and assignment of numbers to all fishing boats, and by the installation of mechanical tabulating and recording devices.

## GAME REFUGES

The Fish and Game Commission now owns and operates four refuges for migratory waterfowl, one of 3000 acres in the San Joaquin Valley near Los Banos, one of 1100 acres in Inperial County, another of 2500 acres in the Sacramento Valley near Gridley, and another of 1720 acres on Joice Island in the heart of the Suisun Bay duck areas.

An elk refuge of 950 acres in Kern County has been purchased with funds made available jointly by the Kern County Board of Supervisors and the State Park Board and turned over to the Fish and Game Commission to operate.

In addition to the operating of refuges owned by the State, this bureau is responsible for the posting and control of predators on other refuges set aside by legislation for the improvement of game. Lion hunters and trappers are employed for this purpose.

## GAME FARMS

California's game farms have continued to attract attention because of the successful use of electric incubating and brooding equipment.

While the major effort of this bureau has been in the production and distribution of pheasants, the valley quail has received an increasing amount of attention, particularly at the southern farm, which has been assigned to that work by the Commission. During the period covered by this report, 48,000 pheasant eggs have been distributed to interested groups and individuals who have raised and released over 14,000 birds from these eggs, while an additional 19,000 pheasants have been distributed from the two game farms. Sportsmen's clubs and other community organizations have been most helpful in this work. As a result, a short open season will be requested at the next Legislature.

During the past season, about 15,000 valley quail eggs were produced and approximately 4000 of these birds will be distributed on refuges where special quail work is in progress.

A real start has been made in the development of areas to increase natural propagation, and to make this increase available to sportsmen. The game rights on selected areas are being turned over to the State. Water and food are being developed in these areas and quail enemies

controlled. These areas are properly posted and patrolled, and certain portions made available for public shooting. It is the hope of the Commission that this work will show the practicability of land owners banding together, selecting a game keeper, and developing a profitable game crop.

Experimental work on wild turkeys has been carried on with encouraging results in some sections. One of the early plantings has resulted in the raising of three broods in as many years since these birds have returned to the wild state.

## EDUCATION AND RESEARCH

Motion pictures of our wild life have been prepared and distributed, lectures have been provided for many meetings, schools have been aided in their conservation studies and numerous exhibits have been placed by the Bureau of Education and Research. In addition, studies have continued on duck and game animal diseases, deer repellents to minimize crop damage, and poison problems associated with rodent control. This bureau works closely with other State and Federal agencies in all matters of research.

Our small, but excellent library, has been maintained for the use of Commission employees and a growing number of sportsmen and scientists who find it of great value.

California Fish and Game, the quarterly publication of the Commission, has been placed on a subscription basis, and all bulletins heretofore distributed free are being sold at the cost of printing.

## FISH RESCUE

This small bureau, with the assistance of sportsmen and commercial fishermen, has saved nearly 15,000,000 game fish during the biennium. This is in addition to the many saved independently by the wardens and sportsmen throughout the State. Considering the small cost of the work and the big results obtained, the Bureau of Fish Rescue is outstanding as a good investment.

## HYDRAULICS

While California has excellent laws for the protection of game fish from losses due to water diversions, dams and various types of pollution, it has required a high order of tactful management to secure the necessary cooperation from the varied interests.

As this report is going to press, information has been received that the right of the Commission to require adequate screening of diversions to prevent loss of food fishes has been upheld in the District Court of Appeal. This decision will be of great assistance in the administration of the work of the Bureau of Hydraulics and will result in the saving of many game fish for our sportsmen.

## LEGAL

One of the major cases handled by the Commission's attorneys was carried to the United States Supreme Court, which court upheld the right of the Fish and Game Commission to prevent the transporting of fresh salmon legally taken on the high seas, through districts at times where possession of salmon is prohibited in these districts.

People vs. Glenn-Colusa Irrigation District is another case of general interest and was pending at the close of the biennium. This important fish screen case has already been commented upon under the heading just preceding.

Numerous other cases have been handled and a great variety of work has included giving legal advice and opinions to the Commissioners and their representatives, the preparation of leases and agreements and the preparation and study of proposed new legislation.

## ACKNOWLEDGMENTS

This report would be incomplete if it failed to acknowledge the assistance which has been given by Federal, State, County and Municipal agencies, by sportsmen's associations and service clubs, and by numerous commercial organizations. The Southern Pacific, Western Pacific, Santa Fe, Northwestern Pacific, Sacramento Northern, and several other transportation companies have generously transported fish cars, fish cans, eggs and hatchery personnel without cost to the Commission. This very material assistance, together with help from the other agencies noted, has made it possible for the Fish and Game Commission to make the sportsman's dollar go much further than would otherwise be possible. In addition, it has joined all conservation agencies in a common task with a resulting increase in efficiency and interest.

Respectfully submitted.

John L. Farley,
Executive Officer.

## REPORT OF THE BUREAU OF FINANCE AND ACCOUNTS

By H. R. Dunbar, in charge

During the biennium just brought to a close, much has been accomplished in the matter of consolidating the revenue of the division in the office of the cashier. This has been brought about, principally, upon the recommendations of the State Department of Finance and the officials of the Division of Fish and Game. The principal functions affected were enactments passed by the State Legislature changing the method of license distribution and the accounting for the funds received from the same; the accounting of fines imposed in the justice courts for violations of the fish and game laws; the transfer of accounts pertaining to the revenue accruing from court fines and fish packers' tax from other offices of the division to the office of the cashier; and placing the control of all bank accounts of the division in this office.

During the 1931 Legislature, a new hunting and angling license act was passed which provides that the hunting licenses, issued as of January 1, 1932, will extend for an eighteen months' period, expiring on June 30, 1933; that for this eighteen months' period, the license fee will be increased 50 per cent. Commencing July 1, 1933, the licenses will be placed on a fiscal year basis, the fee reverting back to the former price. The act also provides that the county clerks make their accounting direct to the Division of Fish and Game monthly, instead of accounting to the State Controller at the end of every three months. This same act also authorizes the Division of Fish and Game to distribute licenses direct to persons who wish to handle them for the purpose of resale, on credit; each person or firm so authorized to handle licenses on credit to be placed under a bond, the premium of which is to be paid by the Division of Fish and Game. The compensation allowed credit agents for sales accounted for is $2\frac{1}{2}$ per cent, while the compensation allowed county clerks and agents paying cash in advance remains at 5 per cent on the actual sales. The purpose of permitting agents to handle licenses on credit, was to stimulate a wider distribution.

The act providing for the disposition of court fines imposed for violations of the fish and game laws was amended requiring the justices to remit direct to the Division of Fish and Game, the division making an accounting to the State Controller and the State Treasurer.

The intent of the above acts, requiring that all license and court fine moneys be remitted direct to the Division of Fish and Game, was to eliminate considerable duplication of work in the offices of the State Controller and State Treasurer and at the same time permit the cashier of the division to have a better knowledge of the amounts accrued and unaccounted for.

In November of 1931, the records pertaining to the accounting of the fish packers' tax and court fines, were transferred from other

offices of the division to the cashier, who became responsible for the collection of all amounts that may accrue. For the purpose of carrying out this work an index card system was established for recording the amount of fines and fish packers' tax accrued and paid to the division by each individual justice or fish packer. The system and results obtained have proven very satisfactory.

In past years the clerks in the several branch offices of the division were authorized to make bank reconciliations and sign checks on bank accounts coming under their control. Upon recommendation of the Fish and Game Commissioners, this practice was changed, with the result that all branch clerks are to report to the cashier, the latter making all bank reconciliations and signing all checks drawn against any of the bank accounts.

Altogether there are eleven different kinds of licenses under the jurisdiction of the Division of Fish and Game, the principal ones being hunting, angling, deer tags and market fishermen's. Below is a table showing the value and number of each of the above kinds of licenses sold for the series of 1929, 1930 and 1931:

| | | *1929* | *1930* | *1931* |
|---|---|---|---|---|
| Hunting— | Value | $488,114 00 | $464,157 00 | $423,718 50 |
| | Number | 241,447 | 231,970 | 214,342 |
| Angling— | Value | $469,442 00 | $508,875 00 | $496,390 00 |
| | Number | 229,374 | 248,319 | 242,394 |
| Deer Tag— | Value | $115,472 00 | $123,999 00 | $129,005 00 |
| | Number | 115,472 | 123,999 | 129,005 |
| Market— | Value | $60,140 00 | $61,790 00 | $56,510 00 |
| | Number | 6,014 | 6,179 | 5,651 |

It will be noticed that on the 1931 series, the sales for hunting, angling and market licenses show a decrease as compared to the 1930 sales. The deer tags, however, have continued each year to show a slight increase. The decrease in the hunting license sales can be attributed, principally, to the shortening of the waterfowl season by the Federal Government.

Other principal sources of income are from fish packers' tax and court fines. The revenue from both of these sources in the past two years has shown a decrease.

The total value of unissued licenses that this office was accountable for to the State Controller as of June 30, 1932, was $1,806,824.18.

In the appendix may be found statements showing the sales of the different kinds of licenses for the years 1931 and 1932.

## REPORT OF THE BUREAU OF PATROL

By E. L. Macaulay, Chief

The personnel set-up of the Patrol Department is substantially the same as that in effect during the previous biennium; a chief at San Francisco, two assistant chiefs, one at San Francisco and one at Los Angeles, sixteen captains (one in charge of volunteer wardens, with headquarters in San Francisco), ninety-six wardens, and two stenographers.

The division of the State into patrol districts, each under the supervision of a captain, has been continued with satisfactory results. A recapitulation of the arrests and convictions, together with the fines and jail sentences imposed, will be found in the appendix on page 114. Compared with previous bienniums, it will be noted that the fines collected have decreased materially, this condition being, no doubt, the result of the various judges taking into consideration pleas of poverty set forth by the defendants. In one month, out of 206 arrests, suspended sentences were given in 57 cases, indicating that while the judges believe fish and game laws should be enforced throughout the State, in many instances they felt that a suspension of the sentence was justified under prevailing conditions. It is gratifying to note, however, that despite the fact that the average fine imposed is a great deal less than in former years, throughout the State the courts have not hesitated to inflict severe punishment in cases of commercializing fish and game.

During the past biennium three veterans of the service have passed away, wardens I. L. Koppel, R. J. Sadler, and H. I. Pritchard. Under the physical disability provisions of the new State Employees Retirement System, Warden Webb Toms, of San Diego, retired from active service on March 31, 1932.

The 1931 convention of wardens was held in April in San Francisco, but the 1932 meetings were held in smaller groups at Los Angeles, Fresno, San Francisco and Chico, to enable the new commissioners to get acquainted with the field men near their respective territories. The smaller meetings worked out very well as all of the wardens present had more or less the same problems and if the commissioners can spare the necessary time it is suggested that a similar program be followed in future gatherings.

The number of state-owned automobiles operated by the Patrol Department has increased to forty-eight. Closed cab pickups, with open steel delivery bodies have been selected as standard equipment for patrol duty, captains being provided with coaches or sedans, to enable them to transport men for emergency work outside their regular territories. All the automobiles which have seen two years service have been replaced with the exception of a few that have run lower than average mileages. On the whole these cars have all given very satisfactory service, particularly since they are obliged to operate on all types of roads. Where a hunter or fisherman will take his private

automobile over an exceptionally poor road once or twice a year in order to reach his favorite stream or hunting area, the warden's car must necessarily travel the same path many times during the season in his ordinary daily work, and we believe that our vehicles do harder work than any others owned by the State.

A new fish planting truck has been placed in service, equipped with compressed air, and will be used principally in Owens Valley, where long hauls are necessary to deliver fish to animal pack trains at the road ends high above the floor of the valley. The old truck operated by the Patrol Department in this work has practically outlived its economical period of operation but will be kept in reserve or used in addition to the new one if required in emergencies.

The boat *Quinnat* which has given many years service in patrolling San Francisco bay will be replaced shortly as it is no longer in condition to do patrol work without extensive repairs which are not warranted in view of the age of the vessel. A new six-cylinder engine has been placed in the launch *Hunter* which is considerably more powerful than the original equipment. The power plant of the launch *Rainbow* has been thoroughly overhauled and should give satisfactory service for some years to come.

The United States Bureau of Biological Survey regulations limited the 1931 waterfowl season to a one month's period and reduced the bag limits on both ducks and geese, and the commission as a conservation measure requested all California hunters to abide by the Federal regulations. To assist in this matter, all regular wardens were appointed Federal game protectors (without salary) and made it part of their duty to inform the hunting public of the reduced Federal limits and season and it is pleasing to note that the sportsmen cooperated heartily in their observance. Market hunting of ducks and geese continued in the Sacramento and San Joaquin areas and probably will continue as long as residents of the larger cities are willing to pay fancy prices for wild game. Courts in the Sacramento Valley region were prompt in awarding substantial fines and jail sentences in market hunting cases but a jury trial in the San Joaquin Valley area proved the inadequacy of the jury system, where the neighborhood is not in sympathy with game law restrictions.

The new striped bass law which prohibits the netting of this fish resulted, after the first netting conviction, in the use of set lines consisting sometimes of many hundred hooks on lines almost a thousand feet long. These illegal set lines were usually placed in position during the night and were difficult to pick up, so well were they hidden. To render this law effective a possession limit should be included durnig the closed commercial season, there being no limit on possession in the present section.

During the coming deer season a new deer tag fastening for that portion of the tag required to be attached to the animal's horns is being furnished. It consists of a metal seal similar to those used in sealing railroad freight car doors and should prevent any complaint on the part of the hunter that he had no string available to tie the tag. The metal seal carries the same number as the deer tag, so even if the tag is torn off, the essential information and protection remains intact.

The 1931 fire season proved a disastrous one for California's timbered areas and in the emergency many of our wardens were detailed for temporary duty in the forests to assist the State Department of Forestry in their important work. The greater portion of our men who work in forest areas carry with them during the fire season as part of their regular equipment portable knapsack pumps which have proven very satisfactory in controlling small fires.

A recent decision by the Attorney General to the effect that game wardens as such were not authorized by law to use sirens or red lights on their automobiles has handicapped our work to a considerable extent, particularly in cases where violators are killing game for commercial purposes. It is dangerous to attempt to halt automobiles without the use of a siren or red lights, and it is recommended that the present statute covering the use of sirens, be changed to include game wardens in addition to those already privileged.

For a long time sportsmen have looked upon fish and game laws as something to make hunting and fishing more difficult, and the game warden an officer to be outwitted if possible. As a matter of fact the game warden is the friend of the sportsman, and since he moves about a great deal over his territory he knows game conditions and is glad to give sportsmen such information. While the conservation of game is the warden's main interest, his duties are manifold. He plants fish, rescues them in times of low waters where necessary, feeds deer and quail during severe weather conditions and exterminates predatory animals in his territory. In desert areas many of our men have developed small water supplies to assist bird life.

Our wardens are instructed to remember that all law enforcement should be with good judgment and that there is a great difference between technical and intentional violations. Arrests for technical offenses only breed a spirit of discontent and make wilful violators instead of friends for conservation. As one of our most successful wardens, long in the service, has said, "The hardest thing is to know when NOT to make an arrest."

Volunteer wardens have rendered valuable assistance, both directly and indirectly. A separate report on their activities is submitted by the captain in charge.

## REPORT OF VOLUNTEER DEPUTIES

By Walter R. Welch, Captain of Patrol, in charge

Under the provisions of section 642 of the Political Code, which section defines the duties of the Fish and Game Commissioners and provides that they may appoint deputies, with or without pay, the Fish and Game Commissioners have maintained in the game fields of the State during the past two years about 625 men who have volunteered their services as game wardens for the further protection of fish and game and the enforcement of the fish and game laws. About 325 of these deputies are bonded to the State in the amount of $2,500 each. Their appointments are sponsored by bona fide fish and game protective associations or clubs. Another 300 of these deputies, who are also Federal forest rangers, are sponsored by the United States Forest Service.

A brief summary of the activities of these "volunteer deputies," compiled from their monthly reports, indicates that during the past two years, upwards of one million miles of game fields, streams, bay shore and coast line were patrolled and that they checked 39,913 angling licenses, 17,969 hunting licenses, 6371 deer tags, and made and assisted in making 505 arrests for violations of the fish and game laws. In these cases fines in the amount of $13,928 were imposed.

In addition to their activities for the protection of fish and game, and the enforcement of the fish and game laws, the volunteer deputies, in cooperation with the Fish and Game Commission in its effort to bring back the supply of quail and to solve the quail problem, have conducted a state-wide campaign to encourage farmers and other landowners voluntarily to set aside part of their lands as inviolate quail sanctuaries and game refuges. In these areas, unmolested and undisturbed, quail and other upland game birds will be afforded a chance to reproduce their kind through natural channels from the nucleus of wild birds in the field.

The effort of the volunteer deputies to set aside land as inviolate quail sanctuaries and game refuges has resulted in the establishment of 1334 refuges. These are situated on private property, and located in nearly every county within the State.

These sanctuaries contain about 600,000 acres of land upon which there are approximately 400,000 valley and mountain quail, as well as numerous dove, pheasant, deer, tree squirrels and rabbits.

In connection with their activities for the establishment of quail sanctuaries, and in an effort to further protect quail and other upland game, the volunteer deputies have conducted a system of predatory bird and animal control work. Under this system, during the past two years, they have killed a total of 8868 birds and animals that are considered to be enemies of quail and other game. A list of the predatory animals killed includes 84 coyotes, 48 foxes, 126 bob-cats, 1186 semiwild house cats, 460 skunks, 66 coons, 35 weasels, 5158 blue jays, 582 crows, 337 magpies, 530 sharp-shinned and cooper hawks, 33

opossum, 24 semi-wild dogs, 32 great horned owls, 71 butcher birds, and 98 snakes.

That this work on the part of the volunteer deputies has resulted beneficially is indicated by answers to a questionnaire returned from about 400 of the landowners who have set aside land as quail sanctuaries. These owners state that the sanctuaries have unquestionably been helpful and that there has been a very noticeable increase in the supply of quail on all of them.

Another result of the sanctuary campaign is that farmers and other landowners are learning that a good supply of quail and other game is a valuable asset to them, to their lands, and to the State; that game requires protection and the laws must be strictly enforced.

During the past winter the volunteer deputies, and many of the landowners, accomplished some good work and prevented the loss of a large number of quail by cooperating with the Fish and Game Commission in feeding quail on areas where a heavy fall of snow had made it difficult for the birds to secure sufficient feed.

On May 23 and 24, 1931, the third annual state-wide convention and pistol shoot of the volunteer deputies of the Division of Fish and Game was held at Los Angeles. It proved to be a big success and was attended by about 150 volunteer deputies, representing nearly every county in the central and southern part of the State, who, at their own expense and without cost to the State, attended and conducted the convention and pistol shoot.

It is pleasing to be able to report that the services of the volunteer deputies have been beneficial to the Division of Fish and Game, and that most of these deputies merit and have received the confidence, respect and support of the sportsmen and the people in their efforts for the protection of fish and game, and the enforcement of the fish and game laws.

It is very apparent, however, that activity in the volunteer deputy organization requires constant personal supervision, and the position they occupy as State officers, requires their strict observance of the regulations governing their activities.

## REPORT OF THE BUREAU OF FISH CULTURE

By J. O. Snyder, Chief

The operating program for the past biennium as established by the former chief of the bureau W. H. Shebley, and his assistant, J. H. Vogt, has been carried out in detail and the statistical part of this report may be regarded as a record of its accomplishments.

An inspection of these statistical tables will show that an enormous effort has been put forth in an attempt to replenish the fish which are annually taken from the streams. In all, 25 hatchery stations with auxiliaries of 2 tank establishments and some 78 ageing and brood ponds have been in operation. These have been supplemented by 30 independent egg taking stations. Some of the latter are

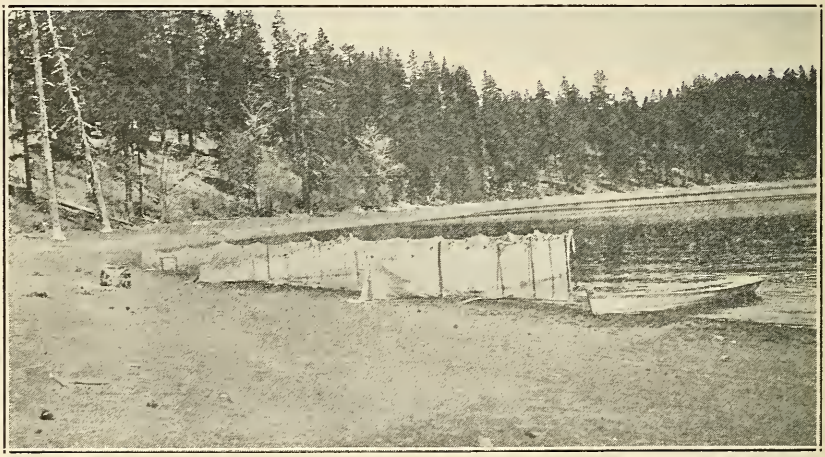

Fig. 3. Portion of Butte Lake, Lassen County, fenced off with a net for retaining trout until they are ripe enough for spawning purposes. Photo by Dr. J. O. Snyder, May 24, 1932.

more or less experimental or temporary. Records show that 67,866,000 trout have been distributed and planted. These include rainbow, cutthroat, brook, Loch Leven and golden trout. Besides salmon of two species, king and silver, have been propagated to the number of 9,328,000. The egg collecting stations have produced 62,151,000 eggs of various species of trout while 16,700,000 have been purchased from without the State. Atlantic salmon to the number of 56,200 have been propagated and experimentally introduced into Klamath and Smith Rivers.

In most cases the hatcheries are in excellent shape and the housing of the hatchery personnel is generally good. Improvements in some places are now under way and others are contemplated. The desirability of simple parking and gardening and the general beautification of grounds has not been overlooked and plans for the extension of

such work are being thought out. It is also intended to place exhibits of an educational nature in certain plants which are visited by many people.

Sportsmen and others have of late offered expressions of dissatisfaction with the results of artificial propagation. While there is no disposition to overlook these complaints, one must appreciate that artificial propagation offers no certain pabulum to offset the unchecked indiscretions of a constantly increasing number of fishermen. Claims of the efficacy of artificial propagation have no doubt been too high in some quarters, expectations have been led too far, and as a result the entire service is often questioned and heckled. If the present methods and results are not satisfactory to those who support them, the cause for the charged delinquency lies partly outside the hatchery. Present and generally accepted methods will produce fish in desired numbers and size, and when failure occurs in the hatchery the cause may usually be found. But, between the time when the small fish leave the hatchery and finally arrive in the angler's basket, there is at present an almost unexplored void, and here is the widely recognized place where inquiry should be directed. It has been suggested that the responsibility of the fish culturist ceases when the fish are produced. However this may be, his interest should continue. Under the present management this Bureau proposes to interest itself in this particular field, and as part of an expression of that interest, there has been selected one of the most competent of its force whose duty it will be to qualify as a distribution and planting expert. It is expected that his activities in cooperation with others who are directly interested will furnish a serviceable tie between the hatchery and the streams. The Cooperative Trout Investigation, described elsewhere, has initiated studies in this field, and its findings will be promptly acted upon.

The bureau has already gone far beyond the experimental stage in the planting of aged fish, particularly in the San Bernardino Mountain region where some 390,000 trout ranging in size from 5 to 9 inches were successfully distributed during the biennium. An expansion of the policy of planting larger fish will require added facilities in the way of ponds and ageing stations. The selection of sites for these must be made with great care.

The feasibility of ageing fish in cooperation with members of sportsmen's organizations is under consideration. Success in some quarters and partial failures in others are reported. It is proposed to offer aid and advice where such undertakings are in progress, and keep informed as to actual results. Advance information relating to contemplated pond construction may in some cases aid in the success of the undertaking, or even guard in a measure against failure.

A continued importation of trout eggs from without the State is not regarded with favor. While each imported egg may be looked upon as a potential addition to the native fish population, it is also a possible carrier of disease, and therefore a positive menace. The bureau should, and eventually will be able to produce eggs of a desired species in sufficient numbers for its own use. The introduction of exotic fishes to a region well supplied with native species of trout, unparalleled anywhere for beauty of color, form, vigor, and other game qualities is to be looked upon as a tacit admission that we are

unable to intelligently conserve and use the splendid species with which nature has endowed us.

Certain fish diseases common to the different varieties of trout seem to be prevalent throughout the State. In most cases they are of well known types and they may be held in check by rather simple means of control, hence their early diagnosis is imperative. Some are difficult to treat in a satisfactory manner. It is proposed to establish within the bureau an agency for the control of disease and the prevention of serious loss from that cause. In this connection it is intended that each station shall eventually be provided with a microscope of simple construction, and that the foreman and others in charge shall acquaint themselves with its proper use in the detection of the presence of certain organisms which are apt to give serious trouble unless their growth is checked.

The writer, under State authority, recently made a trip of observation to a number of the most noted centers of fish culture in the East

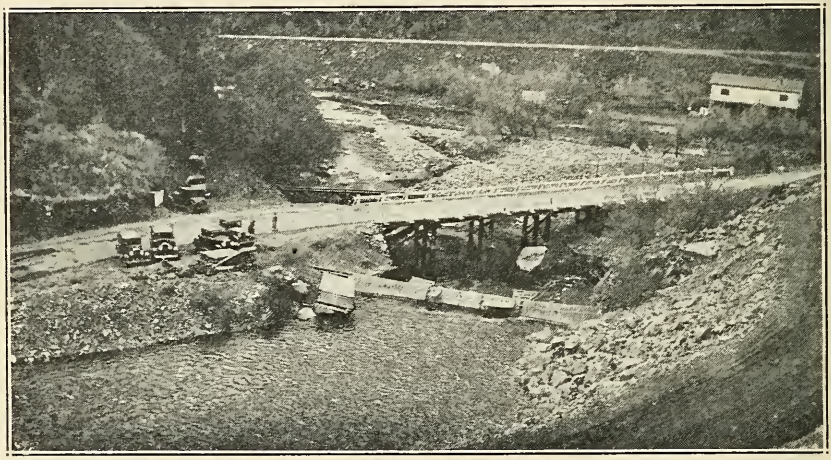

FIG. 4. Counting rack placed in the Shasta River near its mouth for the enumeration of salmon and steelhead passing upstream on their spawning migration. Photo by Dr. J. O. Snyder, November 8, 1931.

and Middle West. Through the courtesy of officials in charge, details of organization, construction, general hatchery methods, transportation and distribution were carefully observed. Some of these may and will be applied here with profit. After consideration of all that was seen and heard, it appears that no definite formulae or set of specific rules relating to construction, feeding, treatment of disease, distribution and planting, or other methods of procedure relating to fish culture may be successfully established for universal application. It follows that the fish culturist must be able to see and grasp the significance of the biological and physical conditions with which he has to deal in any particular situation, and then act in an intelligent manner. This pronouncement is particularly applicable to fish culture efforts and conservation as well in this State with its great diversity of topography and climate.

The propagation of small mouth black bass has been undertaken in an experimental way on a location at Friant, near Fresno. Several acres of water including the usual spawning, stock, nursery, minnow, and daphnia ponds are now in operation. The artificial propagation of the species is attended with many difficulties, even in its native waters, and it is probable that the present effort will severely tax the ingenuity of those in immediate charge.

The valuable biological work of the late George A. Coleman has of necessity been discontinued. Its results have been presented from time to time in published accounts, and an accumulation of field and laboratory notes remains.

The immediate and principal needs of the bureau seem to be:

A reorganization in the present numerical relation of hatchery troughs and ageing ponds, following a policy which opposes the planting of very small and immature fish.

The erection of brood ponds in strategic locations and in sufficient numbers to supply eggs for propagation, thus relieving the natural production of the streams from undue strain.

That supplemental to brood ponds certain limited waters should be restricted to the maintenance of brood stock in a semiwild state.

A rational stream survey which will indicate the best adapted species and the optimum number of individuals which a given area of water may be expected to support.

A carefully matured program of distribution and planting which will profit by the results of a stream survey on the one hand, and an intelligent cooperation of hatchery service on the other.

A revision of plans and methods of transportation which will insure full advantage of recent and future highway construction.

The adoption of uniform and relatively exact methods of hatchery enumeration of eggs and fish.

The establishment of an agency for the prevention or control of fish diseases.

A constant and complete support of the Cooperative Trout Investigation so that the results of its valuable findings may be used at once, and to the best advantage.

No interruption of the present friendly and helpful efforts of other bureaus of the division which add very materially to the results of fish culture, and the continuation of an open minded policy in the management of the affairs of the bureau which will insure sympathetic cooperation between it and the people who support it.

## COOPERATIVE TROUT INVESTIGATION

Early in 1931 arrangements were made by the Division to have the United States Bureau of Fisheries cooperate in an investigation of California trout problems. Under the terms of this agreement the Bureau of Fisheries was to furnish the supervisory personnel and the expenses were to be shared jointly.

Dr. G. C. Embody, Professor of Aquiculture at Cornell University, was engaged by the Bureau of Fisheries to direct the work and A. C. Taft, Assistant Aquatic Biologist who had previously been engaged in the Alaska salmon investigation, was assigned to assist him. A tenta-

tive program for study was outlined and Mr. Taft started work in May, 1931.

A preliminary survey of the State trout waters was made and a great deal of information was gathered through interviews with sportsmen and those interested in the propagation of trout. This preliminary work disclosed a great number and variety of problems which demand an increase in knowledge before they can be properly settled. A great many of these problems are purely local and of necessity must be subordinated to those which are more or less state-wide in their application.

Study is being directed along three general lines as follows: The conservation and protection of the present wild stocks of fish in order that their natural propagation may further supplement the work of the hatcheries; the development of brood stocks, both domestic and in protected natural waters, to relieve certain heavily fished waters from the present drain of egg-taking; the development of knowledge upon which a stocking policy for the State can be based. This will include a study of the relative mortality of fishes of different sizes planted under various conditions and the determination of the more favorable environmental conditions.

As part of the foregoing program of study the following specific projects have been initiated:

A study is being made of the migratory movements of young steelhead in our coastal streams and of the results to be obtained from their protection through the closure of the lagoons to fishing during the summer months. This work is being carried on most intensively in the Garcia River, Alder Creek, Scott Creek, and Waddell Creek. In addition work is being done at the egg-taking station on Scott Creek to determine such facts in the life history of the steelhead as would aid in the increase in the number of eggs taken at this station or a similar station situated on one of the smaller coastal streams. This has included a study of the egg production of females of different ages and the tagging of all fish released after spawning at the Scott Creek station.

An experiment is in progress on the Truckee River to determine the results to be obtained by planting fish which have been held over the summer in ponds. This will be done through marking the fish released and data will also be gathered on the migratory habits of steelhead when planted in such interior waters.

Experimental ponds have also been built at Hot Creek, in Mono County, where experiments are being carried out in rearing fish under the unique conditions as to food and water which exist at that place.

Of necessity, a great deal of time has been given to preliminary work during the past year and plans have been laid for an enlarged experimental program to be carried on during the coming year.

## REPORT OF THE BUREAU OF FISH RESCUE AND RECLAMATION

By George Neale, Chief

The rescue of fish, especially of young fish, would be of little value from the standpoint of conservation if, after they were rescued, they were put back in waters not suitable to their needs, or in waters containing insufficient natural food and shelter. By a wise provision of nature, nearly all of the spiny-rayed fishes choose their spawning beds or nests in those areas where there is an abundance of natural food for their young. After the eggs hatch, it is extremely necessary that natural food be provided upon which the fish may feed after the sac is absorbed and the young fish are in a swimming condition.

Fig. 5. A bagnet full of adult bass and crappie taken from the Mokelumne River. Photo by George Neale, 1931.

In the overflow areas where the water is shallow and dries up early in the year, a great loss of fish life takes place unless rescue methods are adopted. A survey of these areas is made prior to the dry season and suitable regions for the particular species of fish involved are selected. Into these areas the rescued fish are planted.

Past investigations of stomach contents showing the food habits of both young and adult fish have enabled the Fish Rescue Bureau to diagnose areas where environmental conditions are satisfactory for the transplanting of these fish.

### FERTILITY

An adult female black bass will deposit from three to six thousand eggs, according to the size of the fish. Other spiny-rayed fishes, such as calico bass and crappie will deposit from two to four thousand eggs.

In the clear, shallow waters where these fish make their nests, the spawning activities of the various species may be observed by interested onlookers. For this reason, it is an easy matter to determine the proper seasonal limitations and to tell when the open season should be declared. Because the eggs are fertilized and hatched in still water, and because the parent fish protect their nests and eggs during the period of incubation, there is a higher percentage of fertility and hatch among the spiny-rayed fishes than in other game species. The adult fish do not eat their spawn, but after the young are hatched, they are frequently preyed upon by the adults.

### INCUBATION

The eggs of the spiny-rayed fishes hatch in from 9 to 12 days in the warm shallow waters of the interior valleys. Shortly after the young fish hatch, they rise to the surface and remain there for a period of from 12 to 18 days during which time they are nourished from the egg sac. It is during this period, when the young fish are on the surface of the pools that the Bureau of Fish Rescue does its most effective work. Whole broods of several thousand of these small fish are lifted gently in a large scrim net, placed in a large container and rushed to their permanent homes—many times this is done without the loss of a single fish.

### FUTURE SUPPLY MUST BE ASSURED

Since the future supply of spiny-rayed fishes is dependent upon the natural or semiartificial propagation of the species, it would be illogical not to protect them during the season of reproduction. Other states, not having the wonderful natural propagation areas as California, depend largely upon man-made ponds. As it is more economical to rescue the fish which nature propagates without cost than it is to raise them in State hatcheries, the bureau thus occupies an important position in maintaining the supply of perch and bass and other of the species.

### SMALL MOUTH BLACK BASS PROPAGATION

In addition to the rescue work and to advance the interest taken in the introduction of small mouth black bass into the waters of California, the bureau has used all possible effort to secure breeding stock and has succeeded in collecting 4225 fingerling bass of this species.

A number of these fish were distributed into other suitable waters, the balance were the main source of supply for the new propagating ponds recently laid out at Friant, Fresno County. Today, there are very few streams or lakes in the State where small mouth black bass are found. They are most predaceous of all our inland fresh water fishes.

There is in the office of the bureau, at Sacramento, a small mouth black bass 15 inches in length which was choked to death in an attempt to swallow a sunfish $6\frac{1}{2}$ inches long.

### COOPERATION IN MOSQUITO CONTROL

The introduction into this State some years ago of the mosquito fish (*Gambusia affinis*) commonly called top minnow has resulted in a

very wide distribution of this species in the overflow valley districts, especially in the watersheds where the bureau does most of its work. In the netting operations carried on by the bureau, many thousands of these fish are taken annually. The bureau has received many applications for them and has made a number of shipments of these fish to the areas where they are needed in the campaign for the eradication of mosquitoes. These fish are viviparous, producing their young alive. They multiply very rapidly.

STATE-WIDE DISTRIBUTION

Due to the extreme drought of 1931, many ponds, reservoirs and other waters became dry. In the spring of 1932, these areas again filled with water and for the first time in history many applications

FIG. 6. Sorting large-mouth black bass from small-mouth at Salt Spring Reservoir for propagating ponds at Friant. Photo by George Neale, June 13, 1932.

for restocking them with spiny-rayed fishes have been received. These applications will be given attention during the coming season.

The total number of fish reclaimed during the last biennium by species and number follows, except the small mouth bass to the number of 4225 which were required for our propagating ponds at Friant.

BY BUREAU

| *Fiscal Year 1930-1* | | *Fiscal Year 1931-2* | |
|---|---|---|---|
| Green Sunfish, Perch | 2,219,021 | Green Sunfish, Perch | 1,015,578 |
| Blue Gill Sunfish | 460,245 | Blue Gill Sunfish | 1,036,469 |
| Calico Bass, Crappie | 383,057 | Calico Bass, Crappie | 210,235 |
| Sacramento Perch | 102 | Sacramento Perch | 1,993 |
| Catfish | 877,161 | Catfish | 443,697 |
| Striped Bass | 18,560 | Striped Bass | 12,887 |
| Black Bass—large mouth | 3,773,916 | Black Bass—large mouth | 2,795,670 |
| Black Bass—small mouth | 30 | Black Bass—small mouth | 4,225 |
| Trout | 45,110 | Steelhead Trout—adults | 101 |
| Salmon, adult | 213 | Salmon, adult | 1,114 |
| Salmon fry | 435,000 | Shad, adult | 181 |
| Total | 8,212,415 | Total | 5,522,150 |

### COOPERATION BY OUR REGULAR DEPUTIES AND VOLUNTEERS

The season of 1930–31, due to the extreme drouth, would have been disastrous to fish life all over California, had it not been for the cheerful and helpful cooperation of our Chief of Patrol and regular deputies, who, in addition to their patrol duties furnished information to this bureau of the water conditions in their districts. They were furnished equipment and personally rescued many thousands of fish as the record will show, which under the rushed condition of the bureau it would have been impossible to save. A number of sportsmen also contributed valuable assistance gratis.

| | |
|---|---|
| Green Sunfish—Perch | 11,191 |
| Bluegill Sunfish | 16,269 |
| Calico Bass—Crappie | 25,271 |
| Catfish | 191,516 |
| Black Bass | 10,815 |
| Trout | 327,887 |
| Salmon Fry | 435,000 |
| Total | 1,017,949 |

RECAPITULATION

| | |
|---|---|
| Period 1930-31 | 8,212,415 |
| Period 1931-32 | 5,522,150 |
| Deputies and volunteers | 1,017,949 |
| Total for biennium | 14,752,514 |

This is an increase of 7,782,187 over previous biennium.

### ERADICATION OF ROUGH NONGAME FISH FOR 1931-32

Pike, suckers, hardheads, carp and other nongame fish are a menace to edible and game fish life. They occupy water space; they live upon and thrive upon the roots and seeds of aquatic plant life so necessary for the food and protection of young game fish. They eat the spawn or eggs of game fish.

It is true that young of the rough fish furnish a food supply to predatory game and food fish that would consume their own, were it not for the young non-game fish. However, the abundance of rough fish far exceeds the food needs of the game species. It is not our intention to eradicate them entirely, even though this were possible. Enough are allowed to remain to furnish a food supply for the predatory species of game fish.

The rough fish are given to the landowners where much of our rescue work is done. The farmers use them for chicken feed and fertilizer. In 1931-32, approximately 9568 pounds were destroyed.

### RECOMMENDATIONS

Fish rescue work brings this bureau in direct contact with the angler and from an examination of many of the ovaries of the basses and other fish caught by them and from our own observation of the spawning period, I am sure the present open season of from May first is at least from two weeks to a month too early. I have a collection of the ovaries of a number of black bass and other fish of the kind taken from local waters during the past four years which had not spawned

by July first. I am now speaking of the fish in the warm waters of the valley and not of the large or small mouth bass in the higher altitudes, which nest a month later than the valley fish.

### CONSERVATION INCENTIVE

The reclamation of fish from ponds, sloughs or from waters from where, by reason of the drying up process, it is necessary to remove them, is made under the most trying conditions of heat, soft mud, mosquitoes, stagnant water and obnoxious odors. However, there is a deal of compensation connected with the work. There is a fascination about it that compels one to like it. Otherwise, few would care to choose to work in our swamps.

When a net haul or drag is made with the net the operator is as anxious to learn what species of fish the net contains as a miner washing a pan of gold gravel. Then comes the hurried trip to plant them in their new home, seeing them swimming away alive, and then the satisfaction of knowing the job is well done.

## REPORT OF THE BUREAU OF HYDRAULICS

By J. Spencer, Chief

The bureau's activities have been carried on in the biennium practically the same as shown in the preceding reports. Good progress has been made along a number of lines though some difficult problems have been encountered. As the general public becomes better acquainted with the necessity of the bureau's work, these difficulties will be somewhat minimized and the conservation of fish and waterborne life will be greatly furthered. The support of the various conservation organizations and of the State Chamber of Commerce through its different committees with the consequent effect on the public mind is of material aid.

No increase in the number of employees has occurred. Funds from the bureau budget were diverted to the Sanitary Bureau of the State Department of Public Health for sewage research and investigation work. This fund has maintained one investigator. Pollution problems requiring scientific analysis are carried on by the George William Hooper Foundation for Medical Research, which is supported in part by funds from the Division of Fish and Game. The bureau has only three employees, one of whom is stationed in southern California and engaged in prevention of oil pollution. The work is of such a nature that practically all matters within the scope of the bureau require personal inspections, there having been about 2000 of these in the past biennium. The fine support and cooperation received from the patrol forces is of great assistance.

While the regular work of the bureau is concerned with the prevention of the pollution of public waters and the installation and maintenance of fishways and fish screens, at times work of a special nature is assigned to the bureau. One of these matters was the protection of deer on an extensive hydroelectric project in Amador County. This project in part consists of a concrete flume 14 feet wide and 7 feet high, placed on a benched hillside, the slopes of which are generally steep. When this flume was constructed there were included at two places, a number of miles apart, inclined passageways leading from the bottom to the top, the thought being that with six feet of water in the flume and the fairly high velocity of the water that deer would be swept downstream to these passageways where they could then pass out of the flume.

This plan has worked fairly well when the water was at the maximum height but much of the time the depth of the water has been considerably less with the result that the deer that got in the flume, fought the current, their feet and legs becoming worn and torn by rubbing on the bottom of the flume, or they drowned. Careful inspection of the route of the flume showed places where deer congregated or had been in the habit of crossing the line of the conduit and all such places were fenced on the upper bank and substantial bridges constructed across the flume. Fencing was also done on the lower side. The fence is of No. 9 wire with 6-inch stay and carried on 6″ x 6″ posts spaced

about 12 feet apart. On top was carried two courses of double strand wire, making the fence 7 feet high. The fencing of the flume is continuing. The deer taken out of the flume, if in satisfactory condition, were delivered to the county hospital and later to the unemployment camp located in the vicinity where the meat was used.

As time has permitted inspections of dams has gone forward to determine if fishways are required. The records at this time show over 1200 dams in the State but undoubtedly this number will be

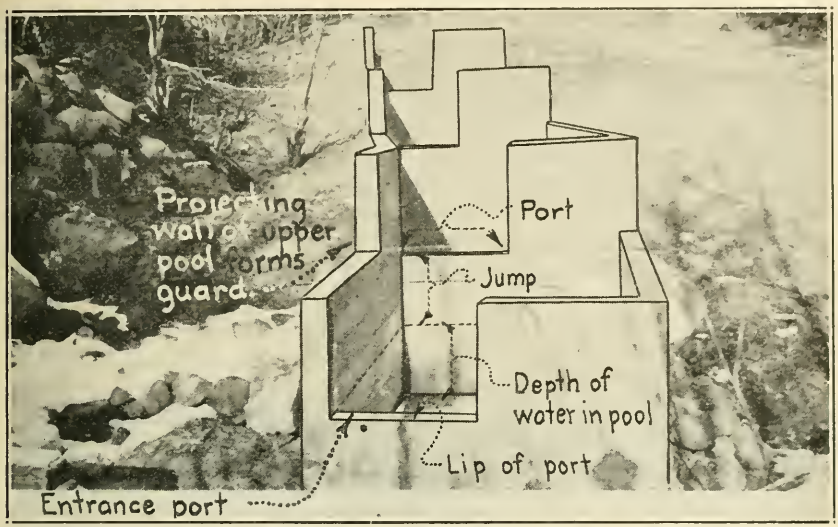


FIG. 7. Portion of concrete fishway without flow of water showing typical construction and nomenclature. Downstream face of dam at left, stream immediately in front of fishway and not shown in photo. December, 1928.

considerably increased when the dams under 15 feet in height are included. Information on dams under 15 feet in height is not readily available. Dams of this height and less as well as dams of greater height obstruct migrating fish and proper fishways are needed.

Work has gone forward with the construction and reconstruction of a number of fishways. Reconstruction has been required where it has been demonstrated that the effectiveness could be improved. In most of these cases, the work would not have been necessary had the original plans furnished by the Commission for the fishway been followed out when the fishway was first installed. In other instances, changing operation conditions or alterations on the dam made changes in the fishway a necessity.

The fishway on the dam at Folsom on the American River was reconstructed, being completed in January, 1932. While steelhead had always been able to negotiate this fish ladder, yet some had been lost due to the fact that the walls were not sufficiently high, but with the alterations and improvements carried on the walls have been raised, additional pools provided, the jump (difference of elevation between pools) has been made uniform and certain pools enlarged and a better regulation of water provided. It is believed that this fishway will be effective though it has not as yet been demonstrated with respect to

salmon. The ascent has been made much easier for steelhead and they have proceeded on upstream with no apparent difficulty.

The sanitary district operating in the vicinity of the Woodbridge Irrigation District dam desired to change operating conditions of this dam in its program of mosquito control making considerable alterations in the fishway necessary. The bureau furnished new plans and money was provided by local contributions, the irrigation district doing the work and also absorbing some of the cost. The fishway as reconstructed appears to be satisfactory.

On the North Fork of the Feather River is a dam which was equipped with a fishway which had not functioned for a number of years due to raising of the water level by the use of flashboards on the dam without any consideration of the then installed fishway. Plans were given to the company owning this dam for the improvement of the fishway and a substantial structure of concrete and lumber was installed. The water level in this reservoir fluctuates greatly over short periods of time and to meet that condition the five upper pools were designed to operate automatically by mechanical means. At the present time, new equipment is being installed which it is believed will make this fishway fully operative at all times. This will make available many miles of desirable spawning area for the migrating trout and salmon.

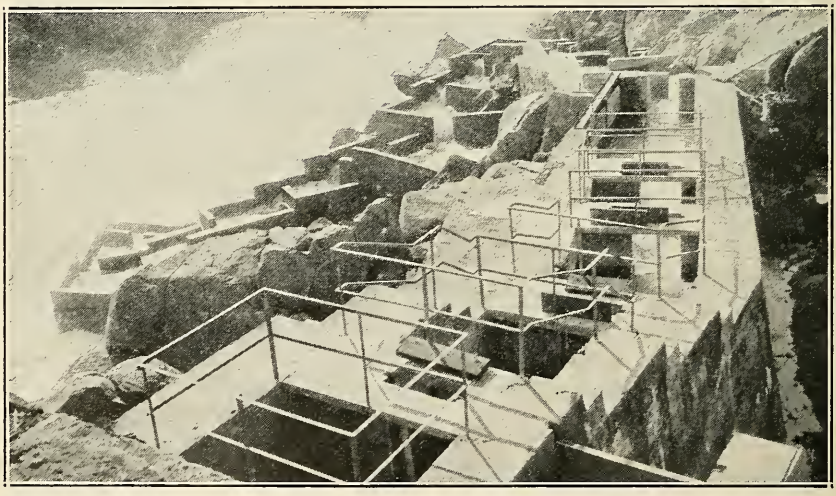

FIG. 8. Fishway over Folsom Dam on American River. Maximum difference in elevation, 45 feet. Lowest four pools (at left) completely submerged. Four adjustable ports at upper section.

At Merced Falls on the Merced River, a new fishway was constructed when the dam at that point was rebuilt and raised. The fishway is of reinforced concrete construction and should require nothing further if conditions do not change.

A company constructed a dam on the South Fork of the Eel River in Humboldt County and did not provide for a fish ladder although plans had been furnished in ample time by the bureau for such an installation. As a result the first run of king salmon ascending beyond

the dam in the fall of 1931 was prevented. The bureau prevailed upon the company to install a temporary fish ladder to pass the remainder of the salmon and steelhead on upstream. The operations of this temporary installation were fairly satisfactory but such construction may only be accepted as an expedient in an emergency. The permanent installation is not yet in place and steps have been taken to protect the State's interests though it is hoped that the owners will fulfill their obligations to the State and avoid the necessity of further action by providing for the next run of fish. Protection was included, however, for the descending fish which will be satisfactory when some minor adjustments are made.

A number of irrigationists maintain a dam about 14 feet in height on the Cosumnes River. This has been a barrier to migrating salmon for about nine years as the owners have not installed a fishway. A superior court injunction against these owners to restrain them from using this dam until a fishway is built is still pending. The owners constructed what is alleged to be a fishway, but in the opinion of the bureau does not conform to requirements as "form, capacity and location" of the structure is contrary to plans furnished by the Commission.

With the exception of the latter case cited, improvements of old fishways and installation of new ones are generally effected through conferences.

In the thirtieth and thirty-first biennial reports, reference was made to the alleged satisfactory working of the fishway on the Baker Dam on the Baker River at Concrete, Washington. Reports now received indicate that this fishway has not been effective and the maximum salmon run up that river is now less than one-half of the minimum that occurred prior to the construction of the dam. This matter is again mentioned to demonstrate that enthusiastic first reports as regards advances in fish conservation may not always be acceptable and also has a direct bearing on dam construction in this State and the general adverse effect on the perpetuation of the anadromous fishes. This is a matter of prime importance and should receive careful consideration.

The work of prevention of pollution of the public waters has continued along practically the same lines as before. Good progress has been made. The work, however, requires constant follow-up efforts though an educated public opinion is helpful and may permit in time a lessening of the check-up efforts though new sources of pollution are always occurring which require attention.

Oil pollution has received the attention of many different organizations of State and national scope. Some of these organizations have done considerable work as the reports issued show. The correlation of these various organizations and the application of the knowledge at hand appears to be of primary importance.

The previous reports have noted the excellent cooperation received from the oil industry. I am happy to advise that this cooperation has continued during the past biennium. For practical purposes, it may be said that no oil pollution occurs from land operations except in cases of accident and the ill effects of these are minimized by the usual

clean-up work which generally follows. This has now become the accepted practice.

The harbors of the State have been generally free of oil pollution with the exception of San Pedro. As long as some oil pollution occurred from land operations, no appreciable efforts were expended on harbor work but in the early part of the biennium, the harbor began to receive concentrated attention. A few cases of careless handling of oil and oil contaminated waters by certain vessels occurred and court action was deemed necessary, but in general the warnings and advice given by the bureau were heeded. A ship service company equipped a boat with pumps, suction hose, tanks, etc., and took contracts to clean up oil spilled on harbor waters. The cost of some of these jobs exceeded $1,000. Certain companies handling oil in the harbor constructed booms which were ordinarily stored, but when an oil spill occurred were quickly run out, surrounding the oil and consequently lessening the cost of clean-up work.

Many other adjustments occurred which decreased oil pollution and the harbor waters gradually improved. Marine growth has taken place in the harbor in certain places, a condition not occurring before in any noticeable degree subsequent to San Pedro becoming one of the largest oil harbors in the United States.

The bureau observed with concern the opening of the Venice oil field. Some of the drilling was done by individuals and companies who gave no consideration to the prevention of oil pollution. As the field was located just above high tide and bordering a body of water with connection to the ocean, the pollution was of considerable consequence. As this field was within an incorporated city, it was hoped that local governmental agencies would see that oil pollution was prevented, but it was finally necessary for the bureau to act. A detailed inspection was made and operators were requested both personally and through the public press, to prevent pollution. Several cases of flagrant pollution were placed before the municipal courts. These resulted in dismissals. The action taken was beneficial, however, as subsequently no oil pollution has occurred from that field which would warrant legal action.

For many years the Truckee River has been under discussion by sportsmen and conservationists who alleged that a paper mill located on this stream polluted the river. These comments undoubtedly had merit, but unfortunately the fact that the cities of Reno and Sparks in the State of Nevada disposed of untreated sewage into the river lower down was apparently not noted. The river is now practically free of pollution as these cities have installed sewage treatment plants and the paper mill has ceased operations.

The generally accepted practice for sewage disposal is to conduct it to the nearest body of water. This may not be so serious when the ocean received this sewage, but when rivers and creeks are used for disposal, the effect on fish and water-borne life can only be adverse. The continued increased diversions of water from the rivers and streams makes the problem more acute. Progress has been made in sewage treatment and the installation of plants, but this movement must be accelerated if we are to cope with the growth of population and have

some reasonable degree of balance. Conservationists should be pleased to know that the men charged with the responsibility of proper sewage disposal are aware of the problem, but no appreciable improvements are possible until the public becomes more informed on the subject and realizes the necessity of proper treatment of sewage to the end that the public waters may be made and kept habitable for fish life. Reliable estimates indicate that untreated sewage from a population of 5,000,000 people will enter our ocean waters by 1940 unless sewage treatment is greatly accelerated over that experienced to date.

The increased activity in mining has brought many inquiries as to the requirements of this Commission with respect to pollution by miners. When consideration is given to pollution problems by the miner it is found that the remedies usually are fairly simple. Every effort is made to be helpful by the bureau so that reasonable methods may be applied and be of the least inconvenience to the operator.

The bureau is pleased to report that the pollution work goes forward and improvements are effected by means of conferences and agreements rather than by invoking legal action. Legal action is resorted to when it is believed the pollution results from wilful or careless acts, or failures to heed suggestions offered for the prevention of pollution. In the biennium 29 cases have necessitated court action. Of this number, 23 were for oil pollution, three were for pollution from mines and three for miscellaneous causes. About 10 of the oil pollution cases were from the Venice oil field. The few legal actions required to prevent oil pollution demonstrates the sincere cooperation received from the oil industry. This is especially significant when it is realized that our State is one of the three leading oil producing states of the Union.

The bureau's work is closely identified with the diversion and use of water in the State. It is not to be expected but that the waters of the State will and must be utilized to the fullest if the State is to prosper. The use of the water need not necessarily diminish fish life though that is what has happened in all too many instances.

When a dam is constructed even if of too great height for successful fishway operation other methods may be employed by the owner to compensate for the obstruction offered to migrating fish.

The diversion of water by means of ditches, pumps, syphons and other means will cause only a slight loss of fish life if there is any desire on the part of the owner to comply with the law, and install a proper fish screen. Such compliance requires no great expenditure and does not deprive the owner of the water.

The continued and increased uses of water makes necessary improved methods of pollution treatment of the trade wastes normally passed into the stream. The dilution factor is generally getting less together with an increase in the industries with their wastes.

Actual cooperation is needed to meet these problems and legal processes should be simplified. It appears that with respect to the fish screen and fishway acts, the owners of dams and ditches are protected much beyond the people of the State. When it is considered that the owners create the problem and receive the benefits, the burden of proof should not be unduly onerous on the State.

## REPORT OF THE BUREAU OF EDUCATION AND RESEARCH

By Leo K. Wilson, Chief

### PERSONNEL

During the biennium just past, the Bureau of Education and Research has functioned as a unit, with a few changes being made in the personnel. Upon the resignation of Dr. H. C. Bryant, who had been in charge of the work since its inception fourteen years before, Leo K. Wilson succeeded to his position as chief of the bureau. Wilson was formerly in charge of publicity under Bryant. Dr. Bryant relinquished his duties with the Division of Fish and Game to assume charge of the educational work of the national parks with offices in the National Park Service, Washington, D. C.

Rodney S. Ellsworth continued his duties as lecturer, doing most of his work in the schools of the State. Because Ellsworth was interested in continuing his degree work in the University of California, as of March 1, 1931, this position was made a part-time one.

Answering the demand for some one to conduct the educational work in southern California, Jack Boaz was engaged as a lecturer in that district operating out of the Los Angeles office.

The pressure of work in the Bureau of Game Refuges made it essential that additional help be employed there. Accordingly, as of January 26, 1931, Donald D. McLean, field naturalist for the Bureau of Education and Research, was transferred to game refuges where he serves in the same capacity. He was replaced by James Moffitt, bird and mammal research worker, a field naturalist of years of experience who has proved to be a most valuable addition to the personnel of the bureau.

E. S. Cheney continued with his motion picture production work and during the biennium has aided materially in the construction of educational exhibits in various parts of California.

As of February 20, 1932, Earl Soto, publicist, resigned and his place was taken over by Opie L. Warner, an experienced newspaper man and one well qualified to fill the position of publicist for the division.

The cooperative work between the Hooper Foundation for Medical Research and the division has continued throughout the biennium. Paul A. Shaw, toxicologist, continued in his work and Dr. M. Hobmaier was employed as of September 1, 1930, as a pathologist, succeeded to the position formerly occupied by Dr. Henry Van Roekel. Dr. Hobmaier came from Vienna where he had been director of the Institute of General and Special Pathology, Histology, Food Hygiene and Forensic Medicine, and thus furnishes the Division of Fish and Game a background of experience which can not be surpassed by the facilities afforded any conservation commission in the country.

E. L. Sumner, Jr., economic bird and animal zoologist, has continued his work on the depredations and interrelations of predatory

animals, particularly viewing this problem from the standpoint of interrelation of predatory species with California quail.

Gordon H. True, Jr., is with the bureau in the capacity of economic bird and animal zoologist, working on parasitism in game species, but is spending most of his time during the last two years on the problem of crop damage from game species.

Mrs. Bessie W. Kibbe has continued to be in charge of the library of the division and Miss Madeleine Monell has continued to be the secretary for the bureau.

### EDUCATION

The educational work in the schools was carried on mainly through the efforts of Rodney S. Ellsworth. Realizing that at the most, the Division of Fish and Game can but contribute to the knowledge of teachers and in a small way give them a source from which they may draw information for the conducting of their classes, Ellsworth's work was devoted to developing a technique of handling the educational work in the schools.

To achieve this end, elaborate programs were planned in the school systems of three of the larger populated centers of the State. In this manner, a workable plan was evolved which should be of great value in the future handling of the school program.

A considerable number of lectures were given before conservation bodies, sportsmen's clubs and interested audiences throughout the width and breadth of California. The work before the service clubs and fraternal organizations brought conservation teachings before a field very receptive to the programs involved and it is felt that much good can be accomplished by further contact with this group.

This is the type of work which has been handled by Jack Boaz in southern California where, during the time he has been with the division, 91 lectures have been given representing a total audience of 8311 listeners.

Realizing that the educational work of the division should not be confined to those only casually interested in conservation work, the bureau has aided materially the other bureaus of the division in the accumulation and dissemination of knowledge. Because of the facilities of the bureau, it has been desirable from time to time to use the organization as a supply source for information of various sorts.

**Summer Resort Educational Work.** The summer of 1931 was the last in which the Division of Fish and Game did any active summer resort educational work. It was decreed desirable to culminate the program to the extent of evolving a complete method of handling the work in the California State Redwood Park. This work was handled by Ellsworth. Conservation was taught to the adult audiences in this well populated camp through evening lectures dealing with fish and game conservation and daily field trips where the work could be demonstrated first hand. At the evening gatherings, the subject matter was illustrated by stereopticon slides and motion pictures.

### VISUAL EDUCATION

During the biennium, rapid strides were made toward bringing to a culmination many of the projects set aside for motion picture work.

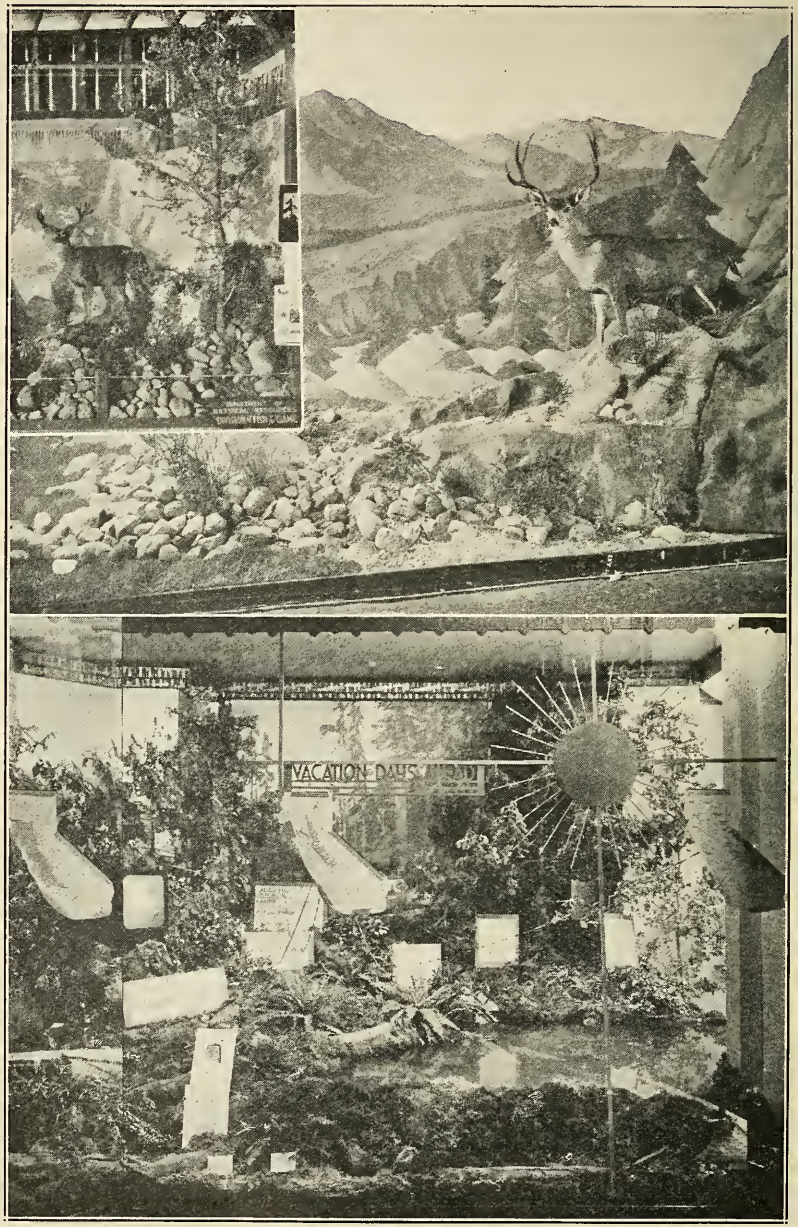

FIG. 9. Characteristic of the many exhibits constructed by the Division throughout the State. October, 1931.

Complete life histories of many game birds were depicted and much material gathered on some species of which the division already had a rather elaborate visual record. Because of the absence of interest in silent pictures as compared with the talking type, it was difficult to proceed with any program which would lead to a greater distribution than we have enjoyed in the past.

Realizing that the continued success of our motion picture program of educational work depends on a thorough coverage of audiences, every effort has been expended toward developing an outlet for our materials. It was found that in spite of all the prepared lists of films which have been forwarded to schools, fraternal organizations, sportsmen's groups and other interested organizations, the response was more or less haphazard and without any real organized plan. Therefore, a program looking forward to the utilization of an established distributional center has been worked out and will be put into effect within the new biennium.

Some of the new material that has been added by Cheney to our already rather complete library of motion picture subjects is some underwater shots of trout, life history sketches of waterfowl, additional sequences of mountain sheep and antelope material and miscellaneous shots of deer and quail.

Due to the increased activity in publicity, a splendid service has been given the working press of the State through the compilation of a more adequate supply of photographic material for reproduction. Every effort has been made to secure outstanding photographic studies of wild life, avoiding wherever possible all the dead game type of pictures which have become passé in all conservation work.

Cheney has added some splendid views of birds and animals in their natural habitats and much material has been acquired from private sources through donation to our bureau.

**Exhibits.** Believing that well designed and well constructed exhibits situated in centers of population are a splendid medium for the educational work of the division, advantage has been taken of every opportunity presented for the construction of this type of display.

The State Fair, at Sacramento, is always an outstanding example of what can be done to depict the wild life of the State. During the progress of the Fair from morning until night, the exhibit of the division was crowded with interested onlookers. Printed material distributed there was prepared with the idea of appealing to all types of readers, and it was remarkable how very little of this material was to be found on the fair grounds. Practically every bit of it was taken home to read. The illustrations were selected from our files and carried out, and the appeal to sportsmen and nature lovers had a lasting effect.

The State Fair exhibit of 1931 depicted in diarama the State of California, starting with the redwood belt of the north and ending with the southern deserts. Everything from the hardy snow plants of the high Sierra to the cactus of the sun-baked deserts was shown, and in the foreground a beautiful trout pool held some of the fine brood trout from the Mt. Shasta Hatchery.

Less ostensible exhibits were placed, or assistance was rendered in placing, as follows:

Boy Scout Merit Badge Exhibit, Sacramento, March 20 and 21, 1931.
Boy Scout Merit Badge Exhibit, San Francisco, May, 1931.
Call of the Open Road, Chester N. Weaver, San Francisco, May, 1931.
First Annual California Outdoor Exposition, Los Angeles, June, 1931.
Gravenstein Apple Show, Sebastopol, August 4-9, 1931.
Los Angeles County Fair, Pomona, September, 1931. Exhibit won a special award of a blue ribbon.
Sonoma County Citrus Fair, Cloverdale, February 19-22, 1932.
San Bernardino Orange Show, San Bernardino, February, 1932.
Boy Scouts of America, Marysville, April, 1932.

## LIBRARY

The history of the library activities during the first part of the biennium was largely one of slow plodding work connected with an inventory and valuation of its contents. In this operation we were fortunate in having additional clerical assistance and such report as of June 30, 1930, was compiled and forwarded to the Department of Finance at Sacramento. The work covered not only the accessioning and evaluating of all books at that time on the shelves, but included also the cataloging and valuation of the scientific publications in our possession, thereby making readily accessible thousands of papers that were in our files. The total value at that date was $5,518.68 of which half represented gifts to our library.

It is hoped that opportunity will be afforded to catalog the serial publications and make accessible more valuable material.

During the past two years, 186 books were added to our file, twenty-five of these being gifts.

Expenses for the two-year period, exclusive of salary and emergency work, amounted to $732.15, showing a saving of just half of the allotted budget.

Number of books on shelves June 30, 1932, total 1341; pamphlets 3636.

Eighty-four weekly and/or monthly periodicals are received regularly, read and routed to the office and field force. This method assists in keeping informed about fish and game conservation work throughout the country.

The splendid cooperation with the other "special" libraries in this territory and the universities has aided materially in the gathering of research material.

The library moved into its new, light and attractive quarters near the close of the biennium, thereby affording relief to the threatened congestion in our stacks.

With the limited personnel of one attendant, and the necessary routine and detail work, it is somewhat difficult to record the exact number of calls and demands made upon the library's facilities. Such records that are available show a splendid growth and continue to demonstrate the need for, and the work of this "special" kind of library, one devoted exclusively to natural history and conservation of fish and game.

## PUBLICATIONS

California Fish and Game, quarterly publication of the division has maintained in so far as possible the high standard set by the present chief's predecessor in office. Great care has been taken to make the magazine one of first impression where only original articles are printed with the exception of those items of historical interest which for salient reasons were never used. An effort has also been made to limit the size of the quarterly. It was found that from the mass of material submitted for publication, the increase in size was becoming noticeable and that in the interest of economy a limit should be set. In the future, 100 pages will be the maximum to which the magazine shall be brought.

The mailing list has been completely revised during the biennium and plans are being made to place the magazine on a subscription basis during the coming few months.

A new game bulletin, "Quail of California" by Donald D. McLean was published and received enthusiastically by the State.

Handbills, previously mentioned, which were distributed at the State Fair covered some of the high lights of the conservation work of the division in this State.

James Moffitt is at the close of the biennium preparing for publication an elaborate treatise on the duck situation in California.

## PUBLICITY

Newspapers and magazines throughout the State have given this department exceptional cooperation, all seeming to be desirous of keeping the half million hunters and anglers of California informed of the activities of the division.

Two and three press releases per week, running as high as nine stories are made from the San Francisco office; a weekly release of two stories prepared by this bureau is made from the office of D. H. Blood, Director of the Department of Natural Resources, and frequent releases made from the Los Angeles office to handle activities in the southern district.

Cuts depicting wild life propagated, protected and distributed by the Division of Fish and Game have been sent to the press and magazines and these have received splendid attention.

Special articles have been furnished all papers and periodicals requesting them and proper illustrations provided where desired.

Radio broadcasts have been numerous and this field is being given especial attention and stations are now seeking information from this division.

Working with the Bureau of Education and Research, the Publicity Department has set before the readers of this State much that has been of an educational nature, and statistical reports that indicate the scope of the work of the division have been given wide circulation.

Contact with publishers of the State press has been extended and the most cordial relations exist between these and the Division of Fish and Game.

RESEARCH

Outstanding of the accomplishments of the research assistants in the bureau has been the work done by Dr. M. Hobmaier on the so-called duck disease of California. Working in cooperation with Dr. E. R. Kalmbach of the U. S. Bureau of Biological Survey, this disease was determined to be Botulinus Type C and since the first published works of Dr. Hobmaier in October, 1930, many steps have been made looking forward to the time when remedies for this situation may be presented. Dr. Kalmbach during the biennium has published the following articles in scientific magazines: "Western Duck Sickness Produced Experimentally." *Science,* New Series, Vol. 72, No. 1878, 1930; and "Progress in Western Duck Sickness Studies." *Science,* Vol. 75, No. 1932, 1932.

Also of great importance to the sportsmen of the State has been the work done by the bureau in cooperation with the U. S. Bureau of Biological Survey and the State Department of Agriculture on the use of poisons in rodent and predatory animal control. At the start of the biennium, E. L. Sumner, Jr., represented the Division of Fish and Game and the American Society of Mammalogists in an extensive field trip to those areas in California where poison had been exposed in the destruction of pests. As a result of that investigation, a policy with regard to the use of poison was determined by the commissioners. That policy, in the form of a resolution, reads as follows:

> *Resolved,* That the Fish and Game Commission has confidence in the U. S. Biological Survey and the State Department of Agriculture and endorses their continued supervision and regulation of predatory animal and rodent control work, but urges these agencies to increase their efforts to prevent unauthorized and careless use of poisons.
>
> *Resolved,* That the Fish and Game Commission further urges that the use of the poison be avoided when other effective methods are available and urges the continuance of studies for the development of control methods which will not be a hazard to humans and to desirable wild life.

For the first time, the Division of Fish and Game has been working with a fixed program with regard to poison activities. Paul Shaw, toxicologist for the bureau, has done some splendid work in analyzing the remains of game and nongame species suspected of having been killed by poison which had been forwarded to the division's office. Only recently, Shaw has completed a new method for the quantitative analysis of thallium and during the biennium has published the following articles on his work:

Shaw, Paul A. Recent progress in duck studies. *Journal American Veterinary Medical Association,* Vol. 30, No. 5. November, 1930.

Shaw, Paul A. Studies on thallium poisoning in game birds. CALIFORNIA FISH AND GAME, Vol. 18, No. 1. January, 1932.

James Moffitt was assigned to the problem of a thorough investigation of waterfowl breeding conditions in California. During the biennium, a rather complete survey has been finished, which, at the present time, is in the process of publication. Moffitt has published several articles on game conditions, among them being:

Moffitt, James. The status of the Canada goose in California. CALIFORNIA FISH AND GAME, Vol. 17, No. 1, pp. 20–26. January, 1931.

Moffitt, James. Diseases reducing tree squirrel population in southern California. California Fish and Game, Vol. 17, No. 3, pp. 338-339. July, 1931.

Moffitt, James. First annual black sea brant census in California. California Fish and Game, Vol. 17, No. 4, pp. 396-401. October, 1931.

Moffitt, James. Some protected birds the duck hunter should know. California Fish and Game Vol. 17, No. 4, pp. 412-420. October, 1931.

Moffitt, James. Banding Canada Geese in California in 1931. *The Condor*, Vol. 33, No. 6, pp. 229-237. Nov.-Dec., 1931.

Moffitt, James. The status of the blue-winged teal in California. *The Condor*, Vol. 33, No. 6, pp. 247-248. Nov.-Dec., 1931.

Moffitt, James. Red-breasted merganser in Orange County, California. *The Condor*, Vol. 33, No. 6, p. 252. Nov.-Dec., 1931.

Moffitt, James. Clapper rails occur on marshes of Salton Sea, California. *The Condor*, Vol. 34, No. 3, p. 137. May-June 1932.

Moffitt, James. The downy young of some foreign species of ducks and geese. *The Auk*, Vol. 49, No. 2, pp. 214-215. April, 1932.

Moffitt, James. The Baikal teal taken in California. *The Condor*, Vol. 34, No. 4, p. 193. July-Aug., 1932.

The work of Gordon H. True, Jr., on depredations of game animals upon the crops of agriculturists and his corresponding work on repellents has met with the wholehearted approval of farmers and ranch owners through the west. Operatives of eastern states have been vitally interested in the problem for the reason that game species are coming more and more in conflict with the interests of the agriculturists. Much of True's work has been devoted to a survey of devices worked out in the eastern states, but much new material has also been added. He has published several accounts of his work, notably:

True, Gordon H., Jr., and Tracy I. Storer. Deer Proof Fences in California. California Fish and Game, Vol. 17, No. 3, pp. 263-269. July, 1931.

True, Gordon H., Jr. Damage by Deer to Crops in California. California Fish and Game, Vol. 18, No. 2, pp. 136-147. April, 1932.

True, Gordon H., Jr. Repellents and Deer Damage Control. California Fish and Game, Vol. 18, No. 2, pp. 156-165. April, 1932.

At the present time, there is no phase of conservation work in California attracting more attention than the quail program. The work of E. L. Sumner, Jr., being carried on at the Alpine Ranch, San Mateo County, is an outstanding bit of scientific research. Breeding birds are maintained under conditions nearly natural as possible and all the environmental factors are being carefully scrutinized. As a result of this program, which will eventually appear in published form, some valuable additions should be made to our knowledge of the cause of those fluctuations in quail populations.

Sumner, E. L., Jr. An outline of the habits of the bobcat with some directions for trapping. California Fish and Game, Vol. 17, No. 3, pp. 251-254. July, 1931.

Sumner, E. L., Jr. Some notes on the birds and animals of the Los Banos duck refuge with special reference to predatory species. California Fish and Game, Vol. 17, No. 3, pp. 270-280. July, 1931.

Sumner, E. L., Jr. An outline of the habits of the striped skunk and little spotted skunk with some directions for trapping. California Fish and Game, Vol. 18, No. 1, pp. 34-43. January, 1932.

In addition to his work on duck diseases, which has been outstanding, Dr. Hobmaier has also been carefully scrutinizing the recur-

ring outbreaks of disease in the deer population of the State. Articles are now being prepared by him on this phase of his work and in addition thereto he has maintained a constant vigil on the sanitary and disease angles of our trout hatcheries and game farms.

Hobmaier, M. Duck disease caused by the poison of the bacillus botulinus. California Fish and Game, Vol. 16, No. 4, pp. 285–286. October, 1930.

Hobmaier, M. Duck disease caused by the toxin of *Clostridium Botulinus C. Proc. of the Soc. for Exper. Biol. and Medic.*, Vol. 28, No. 5303, pp. 339–340. 1930.

Hobmaier, M. Conditions and control of botuli (duck disease) in waterfowl. California Fish and Game, Vol. 18, No. 1, pp. 5–21. January, 1932.

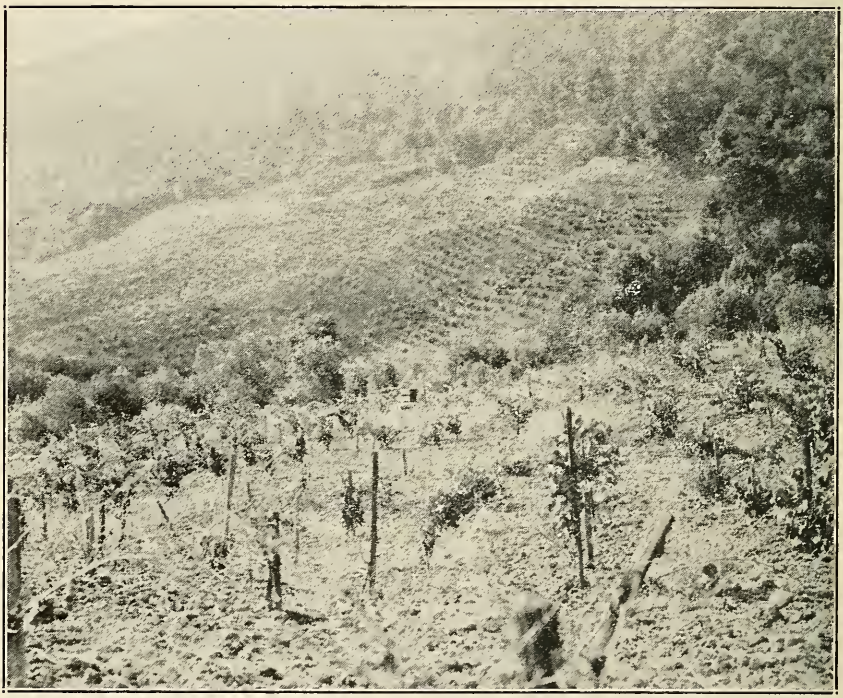

Fig. 10. West portion of vineyard near wild land with groups of vines eaten back or killed by deer. Vineyard of Guiseppe Luchesi, northwest of Yountville, Napa County, California. Photo by T. I. Storer, October 11, 1930.

During the biennium, it is believed that a great amount of good has been accomplished by the educational branch of the bureau, as well as the research workers. However, there is a large field as yet untouched and progress is expected in many lines during the succeeding biennium.

## REPORT OF THE BUREAU OF GAME FARMS

By August Bade, in charge

There is little difference between game bird propagation and the proper handling of domestic poultry, except in the equipment used and the product turned out. The same laws of cleanliness and sanitation prevail and the general rules of reproduction hold true.

It is not enough to hold these creatures within certain defined limits but rather more important to cause them to lay fertile eggs in sufficient quantities to make it worth while. Environment or pen conditions play an important part in this phase of the work. If these birds of the open spaces are to remain healthy and reproduce it is essential that their domestic quarters conform as nearly as possible to their natural habitat. If these conditions are understood and met, much better results will be had.

The question is often asked why this or that species of bird is not bred in numbers on game farms instead of some of the more common ones such as the ring-necked pheasant. The answer is obvious when all the facts are known. Many types of birds, because of their natural temperaments, will not respond when subjected to domestic conditions. If they do respond it will be only in a limited way and not at all dependable. Experience has taught the game breeder which species can be relied upon and has automatically eliminated those types that are unfitted.

As a usual thing game birds may be said to belong to one of two types. They are either aggressive, or retiring, in their general characteristics. If they are aggressive and have that spirit of do or die it will help them when they are confronted with domestic surroundings. If they are timid and easily discouraged they will not respond to confinement and are automatically relegated to the background so far as their value to the program of the sportsmen is concerned.

Most of the pheasants such as the ring-neck, Mongolian, English black-neck, Reeves, and a few others, possess the traits of character that make them great game birds and also cause them to be very dependable in their reproduction under all circumstances. In the partridge family we have found that the valley quail and the Chukor partridge have these traits of aggressiveness and will give a good account of themselves when confined under domestic conditions.

There is another factor of importance in the selection of birds suited to game farming and that is the matter of egg production. Some birds at their best will produce but a limited number of eggs for a season. All of this type are at once disqualified as it is expensive and unprofitable to handle them. The pheasant and partridge family seem to have egg production capacity beyond all others and that is one of the reasons why they are to be found on all well-regulated game farms.

From its native habitat in Asia the pheasant has been introduced in all parts of the world where man has made his home and has now

come to be considered one of the main factors in all programs of restocking where native game birds have given way to the inroads of civilization and the activities of agriculture. The prairie chicken and sage hen, once numerous in all our western states, have faded from the picture, and it is very doubtful if they will ever be brought back. In their places are now found the pheasant and the partridge.

California's program of game bird propagation includes a very comprehensive scheme and the groundwork has been laid for the production of those birds that will best meet the needs of the sportsmen. To this end birds have been selected that will fit into all kinds of climatic and topographic conditions as found in the State.

### THE MEXICAN BRONZE TURKEY

Each year many California sportsmen go to Arizona, New Mexico, as well as old Mexico, to engage in their particular sport of turkey hunting. This sport ranks with deer hunting and by many is considered superior. Contrary to common belief these wary birds are not easily bagged, but require skill on the part of the hunter. Their long legs as well as their strong wings provide the means of escape. The eyesight of a turkey is very keen. Stalking them is a difficult matter and the real turkey hunter resorts to mimicry to get his bird. Turkey hunting requires time and unlimited patience together with a high degree of skill.

Because of the similarity in general conditions of habitat, California has selected the Mexican bronze turkey for its stocking program. Much of California territory is identical with Arizona and Mexican conditions and the progress already made with the introduction of these birds bears out the wisdom of this selection. The Virginia turkey, a smaller bird, whose natural habitat is the swampy areas of the Atlantic states would hardly meet California requirements. The same would be true of the Florida bird whose habitat is the Everglades of that Gulf State. The fourth native wild turkey, the Rio Grande form, would possibly come the nearest to fitting into our climatic conditions, but breeding stock of this species is not available.

### CALIFORNIA VALLEY QUAIL

The plumed knight of the chaparral needs no introduction to California sportsmen. His gameness is never questioned and he meets the troubles of his time like the grand little fighter he is.

A special effort is now being made to rehabilitate this fine gamester by producing them in numbers on our game farms, providing closed areas where they may breed and multiply naturally, and the bringing back in certain localities the water conditions that have spelled their defeat in many instances. Every effort, not only by the Division of Fish and Game, but by interested individuals and sportsmen's clubs, is being put forth to make conditions better in every section of the State for the valley quail. Much has been said and written in the past few years regarding the Bob White and its value to game propagation programs. But little has been said about the valley quail, and yet it is recognized by game breeders who know its possibilities as a far superior bird to the Bob White. For a long time it was thought

that its habitat included only California, but a recent check shows this bird in large numbers in both Oregon and Washington where it is adjusting itself to a more rigorous climate.

The Bob White is a ground living bird. It nests on the ground, feeds there, and roosts in a huddled position that makes its destruction by night-prowling vermin a comparatively easy matter. On the other hand the valley quail spends the night in trees and in that way escapes many of its natural enemies. In general, the valley quail is more aggressive and a stronger fighter for its existence.

In the past two years equipment has been installed at both farms for the production of the valley quail that will put it on an equality with the pheasant. Every effort is being made to produce the foundation stock of breeders so that this program may be carried out in a manner that will produce quail in large numbers.

### THE CHUKOR PARTRIDGE

This fine game bird is a native of India and weighs from twenty-four to thirty ounces. The black stripes along its sides on a background of slate blue give it a camouflage that makes its hunting, except with a dog, an extremely hard matter. It blends into any sort of rocky or dry grass cover with a completeness that baffles the trained eye.

Its range of habitat possibly surpasses all other birds as it has been found from a little above sea level to as high as sixteen thousand feet. However, it seems to have a natural range of around four to

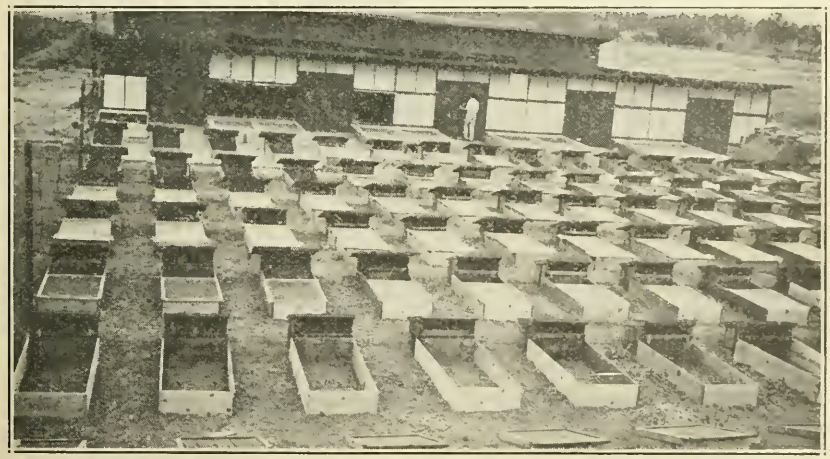

FIG. 11. Thousands of young quail are raised at the Chino Game Farm. The birds grown here are released on sanctuaries protected by the Division of Fish and Game. Photo taken June 5, 1932.

six thousand feet and is known in India as the bird that lives on nothing.

They reproduce well in captivity and the young respond to artificial brooding methods as well or better than any other bird. On the record of this bird for the past two years we would say that it bids fair to become one of the finest game birds yet introduced, and

will occupy a territory that at the present time has but little to offer in bird life.

### THE REEVES PHEASANT

For a long time it was thought that the Reeves pheasant was nothing more than an aviary bird and was chiefly prized for its long tail and gold and black bodies. However, a closer study of the bird revealed all the traits of a real game bird, with a natural habitat ranging from three to seven thousand feet above sea level. While it is a ground nester it is essentially a tree bird and seeks the high trees at night as a roosting place. On the wing this bird takes second place to none as it has been clocked at eighty miles an hour in flight,

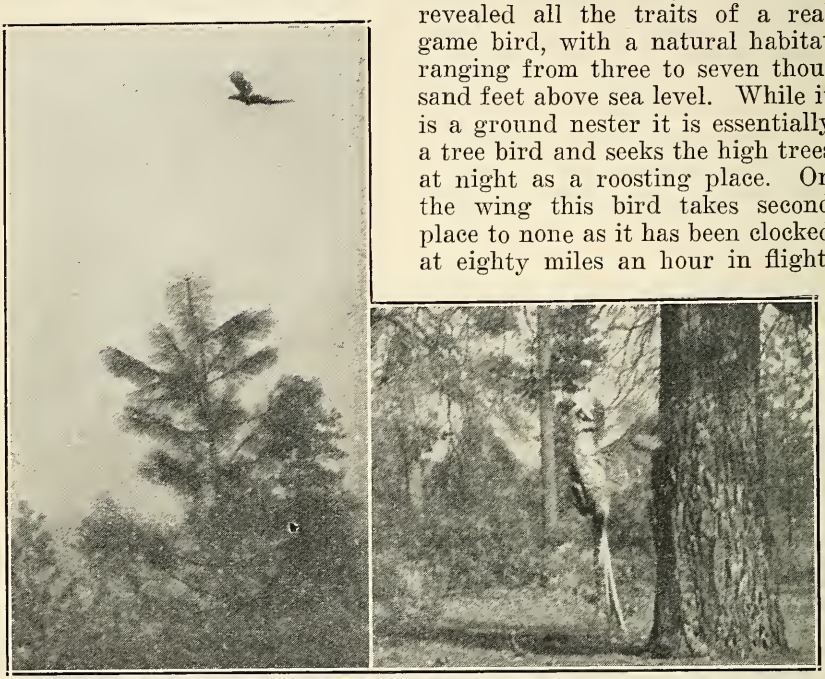

Fig. 12. Reeves pheasants, powerful in flight and inhabiting high timber brush country, are being planted. This picture was made during a liberation at the head of Santa Ana River. Three seconds of time between snaps.

and attains this speed very quickly. When flushed from the ground it goes straight up through the shrubbery or trees till well above them, when it levels off with a tremendous burst of speed that carries it across canyons or down the mountain side.

### THE RING-NECK AND MONGOLIAN PHEASANTS

These birds have come to be known as the intimate companions of man in all parts of the world. Their dependability through the reproducing season is remarkable and under ordinary circumstances they never fail. This trait alone endears them to sportsmen. Their habits and ability to take care of themselves in the fields adds to their value as a game bird. Checked in many states and from every angle, they take first place in any scheme of restocking our valleys and agricultural sections. The farmer has come to regard them as his friend and ally in the control of insect pests. The ring-neck's natural habitat is the cultivated valleys, or swampy lands that provide ground cover as

well as the natural insect life that the bird lives upon. Pheasants adjust themselves to any and all climatic conditions.

### MANNER OF DISTRIBUTING GAME BIRDS

For the past six years it has been the custom to hatch and rear all birds until they were ten to twelve weeks of age at which time they were liberated in areas that had been surveyed and determined suitable for them. This plan called for a large number of rearing pens, and as the number required for planting each year increased, it was decided that some other plan must be evolved, or the equipment at the farms increased beyond the limits of safety.

### EGG DISTRIBUTION

One method of relieving this situation was the distribution of eggs to farmers and interested sportsmen who would hatch and rear the

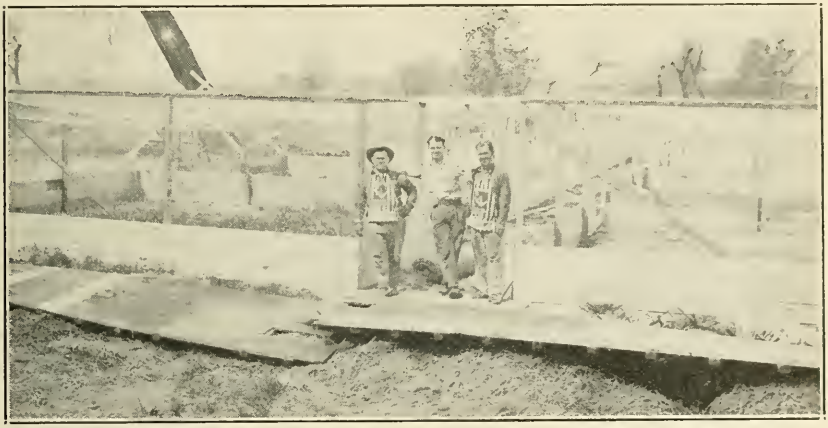

FIG. 13. Twenty rearing pens just completed at Bakersfield by the sportsmen and Chamber of Commerce.

birds and then release them on suitable areas. In order to make this plan successful, it was necessary to get out bulletins describing in detail the operations of setting, hatching, feeding, and the general care of the birds. In so far as was possible a field man contacted the individuals to further assist in the work. Many thousands of eggs were distributed in this way and many more birds were added to the number liberated from the same farms each year. At the same time the interest in this work was increased many fold by the personal contacts with the work and the general knowledge gained by those participating.

### DISTRIBUTION OF THIRTY-DAY-OLD CHICKS

As the plans for artificial incubation and brooding developed it was deemed advisable to offer to those who would provide the pens for the further development of these birds thirty-day-old chicks direct from our electric brooders. This plan has developed beyond all expectations with many clubs, farmers, and interested individuals provid-

ing standard pens according to specifications furnished by this bureau. Bakersfield, through its sportsmen's organization and the Chamber of Commerce, provided twenty pens, the largest number of any community. Other localities have fallen into line with from five to ten pens. All of these projects have been supplied with birds and yet the number reared annually at the farms has not decreased. Plans are being worked out for the further organization of this work to increase even more the number of birds liberated each year. The whole-hearted support given this work insures its success.

### DEVELOPMENT OF QUAIL SANCTUARIES

Early in 1931 it was decided that much more effort would be devoted to the development of quail, both at our game farms, and by the creation of closed sanctuaries where the output of our farms could be planted under the very best of conditions. These areas in many cases were former quail grounds that has been depleted either by overshooting, or the taking away of the natural flow of streams for irrigation purposes.

In many cases water has been developed or provided by tapping pipe lines so that each area of the sanctuary will have ample water for the maximum bird population. In these areas the birds will have the utmost protection and allowed to breed and multiply naturally so that the adjoining territory, which will be open to shooting in season, will soon become populated. To further develop and protect these closed areas, a trapper will have charge of as many areas as can be conveniently handled, and the natural enemies of the birds put under control. It is believed this plan will offer the birds not only a safe home where conditions will be as good as can be possibly made, but that the trapper will become an important factor in their protection from all their enemies.

In addition to the game birds produced and liberated for stocking purposes it has been the custom of the Bureau of Game Farms to provide a certain number of birds each year to be distributed to city parks and used as educational exhibits. Many of the cities of the State, both small and large, now have from six to a dozen or more pens of these birds under the supervision of a keeper and many people who are not able to get out into the fields have an opportunity to become acquainted with such birds as the silver, golden, Amherst, Reeves, Mongolian, ring-neck pheasants, California valley quail, and many other types of birds not included in the game bird family. This feature of the work has proven beneficial from an educational standpoint.

Another educational feature that has been carried on for the past six years, and proven its worth in an educational way, is the system of exhibits at State, county and local fairs. In many cases the local fair associations have provided permanent pens, especially for this yearly exhibit of game birds produced on our farms. These fair exhibits have created much enthusiasm among sportsmen, not only from the point of interest naturally attached to game birds, but also first-hand information on the equipment and methods used in game bird propagation. An attendant is always present to explain and go into the details of all phases of game bird propagation. This feature

has helped many to be successful in their efforts to aid in the production of more game birds.

| | Eggs laid | Eggs distributed to farmers for hatching-rearing | Birds released from farms | Birds released by farmers from eggs distributed | Birds on hand | Total birds liberated from all sources |
|---|---|---|---|---|---|---|
| Pheasants | 121,859 | 48,832 | 18,991 | 14,277 | 5,637 | 33,268 |
| Quail | 15,156 | 150 | 860 | 75 | 2,780 | 935 |
| Partridges | 1,191 | 20 | 60 | None | 460 | 60 |
| Wild turkeys | 1,887 | 477 | 607 | 130 | 288 | 737 |
| Miscellaneous— Silver, golden, Amherst, ducks, geese | | | | | 192 | |

A limited number of silver, golden, and Amherst pheasants are produced each year and distributed to city parks as a part of our educational program. There was also purchased during the year 1930 a shipment of 631 Hungarian partridges that were conditioned for a few weeks on our farms and then released for stocking purposes. On account of the fact that these partridges are difficult to handle on a farm, no particular effort has been made to propagate them in a domestic way as is done with quail, pheasants, and the Chukor partridge. These birds are purchased direct from European exporters and released after a few weeks conditioning into sections of the State that seem best adapted for their natural increase.

## REPORT OF THE BUREAU OF GAME REFUGES

By J. S. Hunter, Chief

Under the provision of the hunting license act providing for the appointment of an Advisory Refuge Committee and for the purchase of refuge areas from a portion of the hunting license fund, four areas totaling over 8000 acres have been purchased. The Advisory Committee has had frequent meetings and has been of great assistance to the commission. The committee is composed of the following members: Nathan Moran, Chairman, Manley S. Harris, Jacob Baum, Dr. K. F. Meyer, Dr. Barton W. Evermann, C. Don Field and Orval Overall. The last named members were appointed in May, 1932, to fill vacancies created by the resignations of J. Dale Gentry and H. L. Betten, the former to become president of the Fish and Game Commission. These men have given freely of their time and to them credit is due for the advance that has been made in our State in acquiring breeding and loafing grounds for waterfowl. At the present time the committee is working on a plan to reflood an area in the northern part of the State which in past years has been the breeding place of thousands upon thousands of ducks. There are many details to be worked out and many difficulties to be overcome, but it is hoped that this will be accomplished within the next biennial period.

### LOS BANOS REFUGE

The Los Banos Refuge, an area of 3000 acres, was purchased in the fall of 1929. In the development of this area it has been necessary to move many hundreds of yards of dirt in the construction of levees and dams in order that water might be held in natural drainage ways. It is necessary, on account of our dry summers, to provide a depth of water that will take care of the heavy evaporation when agricultural interests require all available water and it is not possible to get water for the refuge from irrigation ditches. The season of 1931 was unusually dry with practically no snow pack and only a fraction of the water necessary for irrigation. For weeks there was no water in any of the ditches. In order that some surface water might be maintained, it was necessary to put down a well.

At a depth of 205 feet a sufficient flow was obtained to provide by pumping approximately four second-feet. The water was not of the best quality but is much better than no water at all. Through this well we are able to provide a considerable water surface for the south bound birds when they appear in the fall. The water on the refuge represented practically one-half of the total surface area available on the west side of the San Joaquin Valley.

### GRAY LODGE REFUGE

The second area, Gray Lodge Refuge, of 2541 acres was purchased in the spring of 1931. This area is located in the Sacramento Valley

not far from the Marysville Buttes about fourteen miles southwest of Gridley. Previous to purchase it had been manitained as a private duck club and had provided an annual harvest of nearly 15,000 ducks. As on the Los Banos Refuge, it was necessary to do a great deal of development work. Water conditions were much better than at Los Banos and it was possible, in spite of the dry season, to maintain a water surface of some 1200 to 1500 acres. During the summer of 1931 this was practically the only extensive area of open water on the

FIG. 14. Contented geese—white fronted, Hutchins and Snow.

eastern side of the Sacramento Valley. Naturally many hundreds of ducks nested on the area.

### IMPERIAL REFUGE

In the southern part of the State, after a careful study of conditions by the Advisory Committee, it was decided that the only locality where it would be possible to secure land at a reasonable price and where it would be advisable to create a refuge, was in the Imperial Valley. An area of 1100 acres located along the Alamo River near Calipatria was purchased. Part of the area had been used as a duck club. Another part had been used as a resting place by ducks for years, unknown to the many thousands of southern California hunters. On this refuge we are fortunate in having a surplus of water from the irrigation district available at all times. At the present time there is a surface area of about 400 acres. A more extensive water surface will be provided as soon as the area can be developed. It is believed that by feeding the birds on this refuge, complaints of duck damage to crops in the Imperial Valley will be greatly reduced.

### SUISUN REFUGE

In the fall of 1931 there was purchased 1711 acres located on Joice Island in the Suisun marsh. This area had been maintained as a duck club for many years. The purchase of this area was only possible on account of the depreciated value of land. It was purchased for a fraction of the actual cost. Under normal conditions of the Sacramento River fresh water can be secured during the early part of the year at high tide. On account of the excellent location of this refuge it will become one of the best in the State.

It is believed that excellent results can be secured by the establishment of breeding areas in the parts of the State where the elevation is approximately 4000 feet, particularly in the northeastern counties. In this region many natural marsh areas have been destroyed by drainage and on account of the dry cycle of years that we have experienced, it has been found that drainage, for the most part, has been a mistake and that the land will be of greater value as stock range if restored to its original condition. The committee has under consideration the development of several areas that can be handled at comparatively little cost to the State.

### DEVELOPMENT

After a refuge is secured there is an immense amount of work necessary in order that it may be maintained in the best possible condition. With water held throughout the year, tule growth will gradually encroach on the open water area. In the northern part of the State ditches can be cleared to the best advantage by drag line; in the Imperial Valley where the soil is light, tule growth can be controlled by increasing the depth of the water. Where the soil is heavy, this can only be done by plowing and burning.

On all areas, the growth of natural duck food plants must be encouraged and other feeds established. It is reasonable to say that during the duck season of last year approximately a million and a half birds spent the entire season on and in the vicinity of the refuge areas. With the development of what we already have and the establishment of other areas, it is believed that duck shooting in our State will be stabilized and not subject to the irregularities that have prevailed in past years.

### CALIFORNIA ELK REFUGE

In the 22d biennial report of 1911–12, the writer and Dr. Joseph Grinnell of the University of California, after making a survey of the

Fig. 15. Kern County elk refuge.

elk conditions in Kern County, recommended that an area of land be secured on which the elk then ranging in the western part of Kern County could be confined by a seven-foot fence. Through the cooperation of the Board of Supervisors of Kern County and the State Park Commission, a tract of land has been purchased and the

seven-foot fence recommended twenty years ago is now being constructed. This property of approximately 950 acres is located in the center of the former range of the California elk. It extends on both sides of the Buena Vista canal and is covered by a scattered growth of willows providing excellent shade. The soil for the most part is good and we hope will grow enough natural forage so that it will not be necessary to purchase feed. It is planned to hold only enough elk to

FIG. 16. Mountain lion range in California.

provide for a permanent herd in order that the species may not become exterminated.

## MOUNTAIN LION CONTROL

Twenty-five years ago when the first hunting license act went into effect, the commissioners, F. W. Van Sicklen, Gen. George Stone and John Brimingham, believed that one of the best things to do for the hunters of the State was to reduce the number of mountain lions and

decided, with the consent of the Attorney General, to pay a bounty of $20 for lion scalps. Since that date and up to January 1, 1932, 6396 claims have been paid. In 1917 the bounty was increased to $30 on females. For the last several years, in addition to the bounty, the commission has employed expert lion hunters. Without doubt the work of the commission in lion control is reflected strongly in the present abundance of deer throughout the State. Deer hunters are not the only ones who have benefited, as lions do not refuse to kill live stock when available. There are many records of the killing of sheep and goats and frequently cattle and horses. It has been estimated by good authority that every adult lion will account for at least $1,000 worth of sheep and goats in a year. The average annual kill of lions has been 256. From these figures it would seem that the work of the commission is worth at least a quarter of a million dollars to the wool growers each year. The county record of kill and reference to distribution map on pages 120 and 59 of this report will give information as to the distribution of lions in California. There are few resident lions east of the Sierras. It is likely that the few that have been killed in Modoc, Lassen, Alpine and other adjoining counties during the last 25 years were strays that have worked out of the more favorable country to the west. More than half of the total kill, 53 per cent, has been made in the northwest part of the State. One third of the kill has been in four counties—Humboldt, Trinity, Shasta and Mendocino.

### DEER TAG LICENSE

The deer tag license law has been in effect for five years. The sale of licenses has increased from 110,760 in 1927 to 129,005 in 1931 or 16 per cent. The kill of deer during this same time has increased 32 per cent. Through information that we have been able to gather from the working of this law, we now have a better understanding of the deer situation in our State. We will be able to tell when additional restrictions are necessary in order that a future supply may be assured. An analysis of the kill shows a reduction of the deer harvest in Glenn, Colusa and Lake counties. This may have been caused by the fact that hunters who in former years hunted in those counties transferred their activity to other counties such as Butte, Modoc and Plumas where the kill was practically doubled.

It is particularly interesting to note that in southern California, including Ventura and Santa Barbara counties, the deer harvest increased 41 per cent. This is probably accounted for by the fact that in the years 1929–30 and the first part of 1931, 215 mountain lions were taken in the same counties.

### PREDATORY ANIMALS

The commission has adopted a rather definite program in the control of predators, particularly coyotes and wildcats, on refuge areas. Expert trappers have been employed and a careful record is being kept of the kill. The food habits are studied both in the field and from stomach examinations. This work has not progressed far enough to make a conclusive report and it is hoped it may be continued during the coming biennial period. It is particularly interest-

ing to note that in the examination of over 500 stomachs of various species only one stomach contained quail feathers. This was the stomach of a coyote killed in San Benito County.

Predatory animals are receiving considerable attention by Federal and county agencies. Eleven counties in the northern part of the State paid a total of approximately $35,000 in bounties on wildcats and coyotes. Ten counties, two in the north and eight in the south, paid $3,960 for killing mountain lions. Twenty-four counties, all in the north with the exception of Kern, contributed to Federal and State control $43,513.65. In all, approximately $90,000 was paid by the counties. To this amount should be added the amount expended by Federal agencies. In all, including the money received by trappers for their furs, there is not far from a half million spent each year on the control of predators.

FIG. 17. California black bear. Photo courtesy of Tod Powell, San Francisco.

## QUAIL STUDIES

Two years ago the commission began an extensive study of quail in San Diego County. It was hoped that from this work we would secure information that would enable us to increase the quail population through the improvement of quail conditions. The studies under the direction of Paul Radir, a trained biologist, have necessarily progressed slowly and it will be some time before a complete report can be made. Our progress, however, has been satisfactory as will be learned by reading the following preliminary report by Mr. Radir:

The aim of the quail investigation in San Diego County has been first, to determine the influence of those animals alleged to be quail predators over the life history of the quail and second, to study the various other environmental factors with a view toward their possible modification for the benefit of the quail.

To these ends two areas, as nearly as possible typical of the coastal region of the county, have been chosen. One of them located adjacent to the settlement of Bonita, consists of approximately twelve hundred acres mostly comprised of rolling brush land. The other is located seven miles distant in the vicinity of the Otay Dam. It includes 1900 acres running along the hillsides and the narrow valley of a river bottom. The Bonita area was chosen for the particular study of the predatory animals and a resident trapper was employed on December 1, 1931. He has been trapping constantly since that time and the various predators are quite apparently reduced to a minimum over the entire area. The results of his catch are as follows:

| | | | |
|---|---|---|---|
| Coyotes | 14 | Weasels | 2 |
| Lynx cats | 13 | Red-tailed hawk | 1 |
| Striped skunks | 19 | Opossum | 1 |
| Spotted skunks | 4 | | |
| Domestic cats | 8 | Total | 65 |
| Badgers | 3 | | |

The stomach of each animal caught was carefully examined and in no instance has there been discovered evidence that anyone of them had fed upon quail either young or old. There has been a noticeable increase of rodents and rabbits, however, but the extent to which that is due to an unusually propitious breeding season or to the elimination of the predators can not be determined at this time. Families of newly hatched quail are still appearing and it is not possible to make an accurate census, but an estimated comparison between the population at this time last year and now suggests that the population has more than doubled. It will be necessary to wait until the quail have reached the adult stage in order to take a dependable census.

A special study is being made to obtain predatory evidence relative to the road-runners of this area. To date nineteen have been examined. The stomachs of none of them reveal evidences of young quail or egg shells. There are possibly eight or ten more birds living on the refuge. Coopers and Sharp-shinned hawks are rare and none have been collected.

On the Otay refuge no predators are being taken and the study there is being devoted to the following features: Nesting activities, covey formation and breaking, cover requirements, food materials, movements in relation to food and water supply and the effects of grazing.

The nests are extremely difficult to locate only eight having been found, three before hatching and the remainder shortly afterward. Of the three former, one containing two eggs was trampled by a cow; one contained twenty-four eggs of which twenty hatched and the other twenty-one of which twenty hatched. The five discovered after hatching contained respectively 16, 9, 8, 12 and 10 broken eggs. The one holding ten was the only one with unhatched eggs of which two are included in the count of ten. Hatching had evidently taken place several days prior to the discovery but the embryos were still alive.

The history of the brood from the nest containing twenty-four eggs is fairly complete and appears to be a representative example of the fate of the majority of the families. This nest was first discovered on April 16 and contained twenty eggs. It was hatched on May 4. At the end of the following two weeks the number was reduced to thirteen birds. At the end of that period they were able to take more adequate care of themselves and the same thirteen were counted when they were last observed on July 10th. Before they were able to fly one of the young was captured with a large cactus spine in its leg. It is doubtful if it survived after the removal of the spine as they are decidedly poisonous. The fate of the other six in the family is unknown.

The fate of about fifteen families has been studied and it appears that those originally containing from thirteen to seventeen members are reduced to from six to nine by the time they are able to fly adequately. Several families having but two or three members have been seen. This suggests that there is a predator which will kill a number of birds at one time. This suspicion has rested on the road-runner for a long while and we are endeavoring to study the activities of these birds on the Otay area. Young families of quail are still appearing, one of ten members about two days old was noted on July 15th.

Coveys are apparently formed from families whose daily range overlaps. They are made up of adults and their young which are well able to fly. Young families may live in the same area as a newly formed covey but the parents or young will not join the covey until the latter have reached a more than half-grown stage. Newly formed coveys tend to be large. Of two in this area one contains a hundred birds and is still growing, another eighty birds. It remains to be seen if these large coveys break up into smaller groups as the water or food supply diminishes. The breaking-up of the covey prior to nesting is a gradual process and to the best of our observations pairs are made up of individuals within a covey rather than between individuals of different coveys. What cross-breeding exists between coveys is the result of the manner in which the covey is formed rather than mating outside of the covey.

The character of cover plants afforded for roosting sites appears to be important in determining the size of a covey for a covey will not split up and retain its integrity when the roosting sites afforded are too small to accommodate it and very far removed from each other. Therefore, large compact clumps of shrubbery (Rhus integrifolia and R. laurina in this area) are necessary to contribute to large coveys.

A study of the indigenous seed foods of the quail is being made. This is done by collecting the seeds of the various plants as they become mature and determining

their relative abundance at the different seasons. Quail are taken at intervals directly after a feeding period, their stomach contents listed and compared with the relative abundance of the seeds from the vicinity where they were feeding. This in order to determine food preferences. The study has not proceeded far enough to draw definite conclusions.

The quail on this area need water at least once during the day. In one instance a covey travels a half mile, a part of which is over open river bottom, in order to drink. They drink quickly and immediately return to their resting ground at the base of the hills. When a drinking place dries up a covey will tend to migrate and live permanently near a source of water rather than to remain on the old feeding ground and make long trips for a drink.

On the Otay area the outstanding influence over the distribution and numbers of quail is "over-grazing" by stock. The cattle eat the plants before the seeds are mature and thus are a decided food competitor. They break the branches of plants used for roosts in order to get shade for themselves and cover their range so thoroughly that, during the spring, they destroy many nests. Their foraging destroys the small cover, grass, etc., which appears to be of considerable protection for nests. The five nests cited above as being found after hatching were all within an area some three hundred feet square that had been so slightly grazed there was a good stand of fox grass, alfilaria, etc.

Three small areas, fifty feet square, at appropriate locations on the refuge have been fenced from the stock. As the water supply diminishes or the food becomes scarce artificial water and feeding will be provided at these places and the effect noted on the distribution of the coveys.

## REPORT OF THE BUREAU OF COMMERCIAL FISHERIES

By N. B. Scofield, Chief

The production of California's commercial fisheries follows very closely the nation's prosperity curve. When prosperity in the country is increasing, the production of the fisheries increases at about the same rate. When a depression comes, the fisheries production declines. Individual fisheries may vary from this rule, due to increase or decline

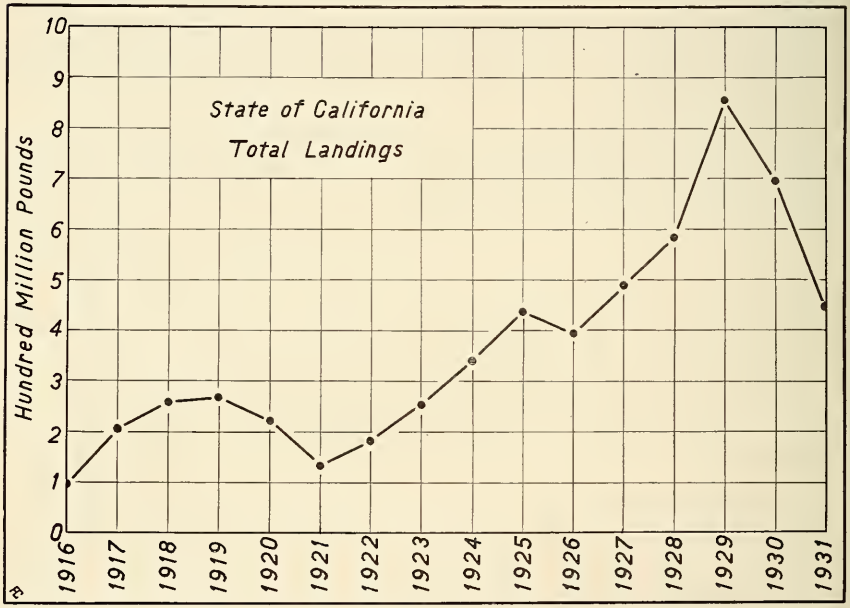


Fig. 18. Total landings of fish (exclusive of mollusks and crustaceans) in California. Importations from Japan and Hawaii have been omitted. Catches south of the International Boundary have been included. "Other Fish" consists of the combined species of fish except sardines. The top of the black bar represents the total of our so-called "local" catch.

in abundance of certain species of fish but, as a whole, the fisheries industry of the State responds quickly to the fluctuations in prosperity.

This can be seen by referring to Fig. 18 which shows the total landings of fish in the State, by years, since 1916. The decline in production during the depression of 1920 and 1921 is plainly shown. Then, with the rising prosperity, the production of the fisheries increased rapidly to the peak year of 1929. The years of 1930 and 1931 show the effect of the recent depression. It is worthy of note that the sardine catch, the largest of California's fisheries, represented by the black bars in Fig. 19, is affected more by depressions than the rest of the fisheries, although the canned sardines produced in California constitute one of the cheapest foods produced in the country. The production of the other fisheries shows the same response to financial depression, but in a less marked degree.

The statistics of the commercial fish catch are more readily compiled by calendar years than by fiscal years as the fishing seasons, with the exception of sardines, fall in calendar years. The statistics compiled by this bureau are therefore for calendar years.

In the year 1930, 577,860,967 pounds of fish were taken in State waters and off the California coast, and 20,278,271 pounds of shellfish were taken in the same waters. In addition to this, 87,927,515 pounds of fish were caught off the coast of Mexico in territorial and extraterritorial waters by California fishermen operating out of California, and 1,020,269 pounds of shellfish were caught by Mexican and California fishermen in the same waters and brought into California. The total amount of fish and shellfish caught in the State and brought into the State, during 1930, was 687,087,022 pounds.

In 1931, 374,464,898 pounds of fresh fish were taken in State waters and off the coast of California, and 10,370,963 pounds of shell-

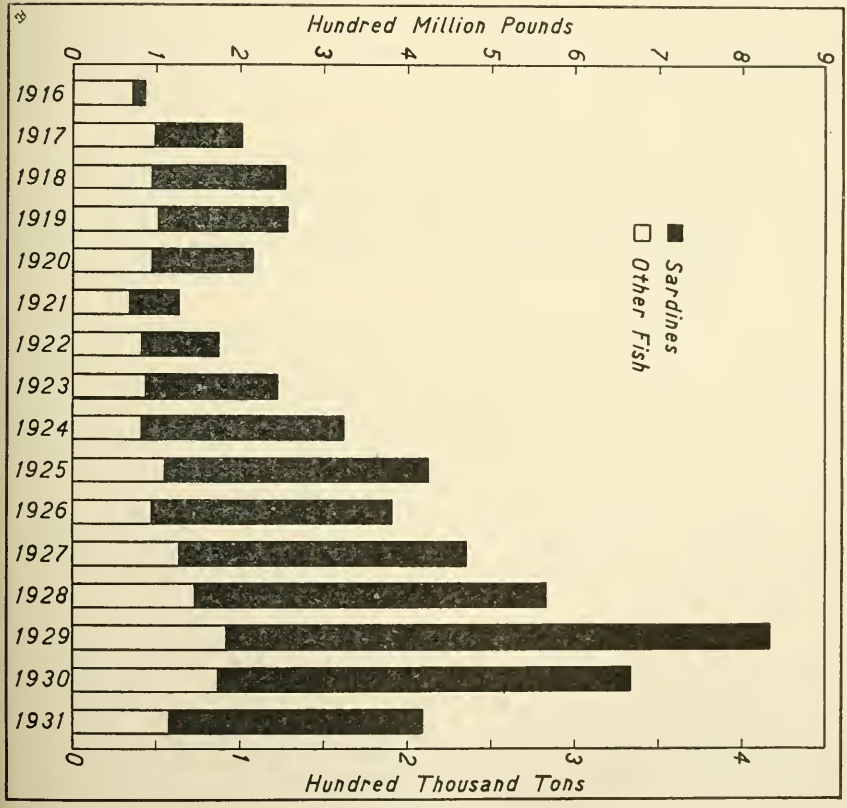


FIG. 19. Total landings for State from 1916–1931, including all fish, mollusks and crustaceans.

fish were taken in the same waters. In addition to this 44,122,239 pounds of fish were caught off the coast of Mexico, in territorial and extraterritorial waters by California fishermen operating out of California, and 968,991 pounds of shellfish were caught by Mexican and California fishermen in the same waters and brought into California.

The total amount of fish and shellfish caught in the State and brought into the State during 1931 was 429,927,091 pounds.

The fish and shellfish caught and landed in the State from the above sources during the two years represent a decrease of 21 per cent over the preceding two-year period.

The sardine fishery, which is by far the largest and most important in the State, shows a decline in catch of 26 per cent for the same periods. The sardine catch for the years 1928 and 1929 was 1,072,041,-569 pounds, which was an increase of 70 per cent over the two preceding years. The catch of sardines for the years 1930 and 1931 was 795,301,274 pounds, a decrease of 26 per cent.

The Bureau of Commercial fisheries has continued to publish quarterly in California Fish and Game the amount of each kind of fish landed in the State. Statistical circulars are issued shortly after the close of each year, giving the fresh, canned and other fishery products of the year. At a later date we issue a fish catch bulletin which gives the catch in each district by months, and contains special articles giving the important developments and the trend of the different fisheries. These are shown in graphic form and are of special interest to members of the industry and to laymen interested in conservation.

Statistical Circular No. 5, for the year 1930, shows the amount of each variety landed during the year at the different fishing centers. It shows also the number and location of the fish packing plants, number of employees and the value of the pack. It contains also, for the benefit of sardine canners, a separate report of the sardine fishery for the season 1930–1931.

In the year 1930 the fish packing plants of the State, exclusive of fresh fish plants, were valued at $10,012,863; the number of people employed in these plants was 7619; there were produced 5,159,239 cases of canned fish, 35,639 tons of fish meal, 5,842,763 gallons of fish oil, and other miscellaneous fisheries products, totaling $26,282,218 in value. There should be added to this the value of the fish and shellfish handled fresh by the markets, estimated at $4,000,000.

According to figures compiled by the State Fish Exchange, there are 1542 persons employed in the marketing of fresh fish, as follows: 90 wholesalers employing 832 people, 226 retailers employing 342, and 365 fish peddlers.

Statistical Circular No. 6 for the year 1931 covers the same activities as previous circulars. The value of fish packing plants is given as $9,474,104; there were employed in these plants 6779 persons; there were produced 3,158,465 cases of canned fish, 22,440 tons of fish meal and 3,924,692 gallons of fish oil, with a total value of $13,795,186. There should be added to this the value of the fish and shellfish handled fresh by the markets, estimated at $3,000,000.

The number of commercial fishing licenses sold in 1930 was 6179, an increase of 165 over the previous year. The number of licenses sold in 1931 was 5651, a decrease of 528 as compared with 1930.

### SARDINES

The sardine fishery, although more seriously affected by the financial depression than any other of the State's fisheries, continued through

the biennial period to yield products in excess of that of all the other fisheries combined. This superiority over the other fisheries, however, has declined to about that of five years ago. This is graphically shown in Fig. 19. The total catch of sardines for the years 1930 and 1931, as already stated, was 26 per cent less than that of the two preceding years, but the decrease appears even greater when the comparison is made by seasons, as in the following tables:

Sardine Season 1930–1931

| | |
|---|---|
| Amount of catch, 344,002,000 lbs. | Decline from previous season 46% |
| Pack of pound oval cans, 1,739,266 cases | Decline from previous season 53% |
| Pack, other size cans, 416,122 cases | Decline from previous season 35% |
| Sardine meal, 18,523 tons | Decline from previous season 47% |
| Sardine oil, 4,757,566 gallons | Decline from previous season 25% |

Sardine Season 1931–1932

| | |
|---|---|
| Amount of catch, 262,640,000 lbs. | Decline from previous season 23% |
| Pack of pound oval cans, 1,460,900 cases | Decline from previous season 16% |
| Pack of other size cans, 210,485 cases | Decline from previous season 49% |
| Sardine meal, 15,039 tons | Decline from previous season 18% |
| Sardine oil, 3,517,983 gallons | Decline from previous season 26% |

The causes of this decline in the production of the sardine fishery are many but the principal ones are overproduction of canned sardines as well as of the so-called by-products, oil and meal; the world-wide financial depression; competition of Japanese and Russian sardines, fish meal and oil; unfavorable rates of exchange for goods sold in foreign countries and high tariffs levied by other countries against our sardines.

In our last biennial report we told of how the fish reduction act of 1929, which permits canners to use 32½ per cent of the sardine catch for reduction purposes, stimulated the canning of sardines in order that the larger profit might be made on the percentage used for reduction, until the sardine catch of the season of 1929–1930 reached the unprecedented amount of 322,600 tons, and this in spite of the fact that a closed season was established which was designed to reduce the catch 20 per cent. The theory, that the sardine catch would be limited by the amount of canned sardines the markets would absorb, did not work. The price of canned sardines had declined still further below the cost of production and the market for the so-called by-products, oil and meal, had experienced a decided slump.

The 1930–1931 season opened with an estimated carry-over of 500,000 cases of canned sardines. The price asked for these was ridiculously low and the prices on the by-products—fish oil and meal—had still further declined. The price paid to fishermen was reduced from $11 per ton to $8. The season was marked by a reduced pack and by price-cutting and fishermen's strikes.

The sardine season of 1931–1932 opened with the warehouses of the packers practically empty of canned sardines. A price of $8 a ton was again agreed upon by packers and fishermen. There was some trouble at Monterey over prices but the season passed without the strife which characterized the previous season. Due to poor markets, a number of the packers did not open and several others were open for only part of the season. The price of sardine oil for the season was

very poor, falling as low as 12 cents a gallon. Packers in the San Pedro district are ordinarily at a slight disadvantage as compared with Monterey, due to the greater oil yield per ton of sardines at Monterey, but when the price of oil fell, that advantage was largely removed. The result was an increase of 16 per cent in the sardine pack at San Pedro, whereas there was a decrease of over 25 per cent in the Monterey and northern California district.

In July, 1931, the commissioners issued General Order No. 12, which prohibits fishermen from bringing in more sardines than ordered by their canner, and also requires that fishermen avoid taking more sardines in their net than they can dispose of, and to permit the sardines accidentally taken in the net, in excess of their needs, to escape before they start brailing.

During the 1930–1931 sardine season fishermen frequently brought in more sardines than their cannery ordered, on the chance that the excess amount would be accepted, possibly at a reduced price, or that some other canner or edible oil plant would take them. This was an old practice, but during this season, when the canners were curtailing their canning operations, the excess catches frequently were not disposed of and were therefore dumped at sea by the fishermen on their next trip, and were a total loss. The waste from this cause was small in the San Pedro district, but at Monterey the waste for the season amounted to 2000 tons, or 1½ per cent of the tonnage landed.

This practice was cured by the enforcement of the commissioners' General Order No. 12, and the waste during the season of 1931–1932 was negligible.

That part of the commissioners' order which had to do with preventing waste of sardines by fishermen impounding more fish in their nets than they cared to take aboard their boats was arrived at after consulting many fishermen at Monterey and San Pedro. It was quite evident that the reports of destruction and waste of sardines, which it is claimed the ring nets and purse nets are responsible for, have been greatly exaggerated by members of the old lampara fishermen group. The three types of nets can be wasteful if improperly or carelessly used. The fishermen interviewed stated that the regulations as embodied in General Order No. 12 would be welcomed by the better fishermen. The regulations of the order have been carefully enforced and are working out satisfactorily. It is believed they will not need to be altered in any essential part.

A further investigation of the operation of the three types of sardine nets has been carried out by members of the State Fisheries Laboratory, the results of which will be published in California Fish and Game.

### SARDINE LEGISLATION

As already stated, the fish reduction act for the regulation of the sardine industry, as amended by the Legislature in 1929 so as to permit canners to use 32½ per cent of the sardines in their reduction plants and also provided a closed season, was expected by the canners to reduce the pack of canned sardines and strengthen the sardine canning industry. The law did not work out as canners expected it would. The next sardine season (1929–1930) saw the largest catch in the history of the industry (322,600 tons). The large catches for the three

seasons ending in 1930 average over 250,000 tons each and caused overproduction. The great increase in the amount of sardines caught was the result of fishing in waters more distant from the canneries and by a greatly increased fishing effort. More and larger boats and larger and more efficient nets were used. The increase in fishing effort was greater than the increase in the catch. This increased fishing effort could not increase the catch in nearby waters, and there was every indication that the sardine supply was being overtaxed.

At the 1931 session of the Legislature the Division again sponsored a bill which would reduce to the minimum the amount of sardines which could be used by canners for reduction. The bill would also eliminate the provision in the law which allowed the Division of Fish and Game to grant permits to plants to take sardines for the purpose of manufacturing edible products from the oil extracted. The canners could not agree, at first, on what they wanted other than that they preferred to do away with the incentive to overproduce canned sardines for the purpose of making the quicker profit on the fish meal and oil of their by-products plants, by a law which would give to each canner a certain amount of sardines for a season to use for reduction when and as he pleased; the amount actually used in canning not to be charged against his allotment.

It later developed that it was the sentiment of the legislative fish and game committees that the Division of Fish and Game should fix the maximum amount of sardines which it is safe to take in any one season, and that the Division be given power to allot this amount to the sardine plants. The Division and canners decided that 200,000 tons would be a fair amount for the maximum tonnage which could be safely taken without depleting the supply of sardines. The canners, however, could not agree on how the amount should be divided among the sardine canning plants. The opposition of those who would take sardines for edible oil or for straight reduction succeeded in defeating the bill. Since that time it is believed that the majority of the interested parties are in favor of fixing the maximum amount which can be taken at 200,000 tons, or give the Division power to fix the amount and then let the fish be used for any purpose desired.

### FLOATING REDUCTION PLANTS

In November, 1930, the *Lake Miraflores,* a motorship of 4500 tons, belonging to the Santa Cruz Oil Co., began operating as a reduction plant off the coast of San Mateo County but outside the State's jurisdiction, the object being to take sardines for reduction purposes without paying State taxes and without being subject to the restrictions imposed by the State's fish reduction act. At the same time this ship took advantage of the State's harbors for protection and for landing its products. It employed fishermen who had formerly had the privilege of fishing in State waters and who continued to use the State's harbors, and who expect to continue fishing in State waters after their present contract with the *Lake Miraflores* is ended. This plant, after a great many difficulties, ceased to operate early in March, 1931. At the opening of the sardine season in northern California on August 1, 1931, the *Lake Miraflores* began operating again off the San Mateo

County coast and continued until February of the following year. The ship took an estimated amount of 21,000 tons of sardines.

There appears to be no present way of preventing the operation of such plants which lie just outside the State's jurisdiction and make free use of what are considered the State's fish. Under the federal laws and rulings of the customs courts, such a plant does not pay an important duty on fish meal or oil unless it is operating under a foreign flag.

A cooperative company of twelve or fifteen California purse seine boat owners have contracted to take over the old motorship *Lansing,* used by the California Sea Products Co. for a number of years in whaling operations. This vessel is being refitted with modern presses and cookers sufficient to handle 900 tons of sardines daily, and the company expects to begin operations off the northern California coast about October 1, 1932. The company hopes to take 50,000 tons of sardines during the season.

The fish for these floating reduction plants are caught outside the three-mile limit, and a constant watch has been kept of the fishermen's operations by the patrol boat *Albacore,* to see that they do not fish within the State's jurisdiction.

## SALMON

In each biennial report for the past ten years we have told of the very serious depletion of the salmon—at one time the most valuable of the State's fishery resources—and of how we had not succeeded in getting adequate protective measures passed by the Legislature. Such measures as were passed to curb sea trolling for salmon proved to be defective, and we were prevented from enforcing them in the more important districts by court injunctions.

This time we have a different story to tell. Most of the commercial fishermen agreed to the protective measures proposed, and a very satisfactory bill was passed by the Legislature as an emergency measure. In addition to this, the cases in court, in which the State's right to prohibit the possession of salmon caught outside the three-mile limit was challenged, were decided in favor of the State.

One of these was a United States Supreme Court decision which definitely upholds the State's right to establish closed seasons in the ocean trolling districts and to enforce these seasons by prohibiting the possession of salmon, irrespective of where they are caught. This is a very important decision for conservation, as it is now definitely settled that a State can give protection to salmon off its coast and outside its jurisdiction by prohibiting their possession within its jurisdiction.

These decisions made it possible also to enforce independent seasons for the different districts along our coast. Seasons were therefore adopted for the ocean trolling districts which give protection during the times of the year when the majority of the salmon are small and immature. These seasons also give protection to the latter end of the run of adult salmon as they pass up our coast, preparatory to entering the streams for the purpose of spawning.

The importance of better protection for the salmon while they are in the ocean can be seen when it is known that from 1916 to 1926, the

amount of salmon caught on trolls in Monterey Bay and outside the heads at San Francisco equaled the amount caught in the Sacramento River, and that since 1926 the ocean catch at San Francisco and Monterey Bay has averaged nearly double that of the Sacramento River. Beginning with 1916, the total river catch of salmon in the State was but slightly less than the total ocean catch but, since that time, the river catch has declined more rapidly than that of the ocean until during the last five years the total river catch has been only one-third as large as the ocean catch.

One of the most important measures for the protection of salmon in the ocean was a minimum size limit of 27 inches for Chinook salmon and 24 inches for silver salmon. The minimum size limit for Chinook salmon was based on the salmon investigations carried on for a number of years by Dr. J. O. Snyder. These investigations showed that, during the trolling seasons as adopted, 27 inches would be the size which comes about midway between the average size of the group of salmon which have passed the age of three years and are in their fourth year and the average size of those which are in their third year. As each age group of salmon tends to school together, the fishermen will avoid the schools which are composed of salmon in their third or in their second year. This measure, contrary to the expectation of many of the fishermen, has worked out very satisfactorily and the fishermen are now mostly satisfied with the limits adopted.

The Sacramento River fishermen voluntarily agreed to abandon fishing for the fall run of salmon—which is much the larger of the two runs—above Rio Vista bridge on the Sacramento and above a point on Venice Island on the San Joaquin. A new district, 12-C, was therefore created for this part of the two rivers and the season closed during the entire time the fall salmon are running.

As a result of these excellent measures, the catch of salmon in 1931 was less than the previous year in all districts except in the ocean districts from Mendocino County north. Many more salmon than usual escaped up the rivers to spawn and the spawn-taking stations and hatcheries of the State and of the U. S. Bureau of Fisheries, whose capacities had been cut down with the decline of the salmon runs, were taxed to their utmost. The take of salmon eggs by the U. S. Bureau on the Sacramento River was the largest in many years, and it was the first time for an equally long period that the U. S. Bureau had to turn over some of the eggs to the State for hatching. If we can hold the ground which had been gained, there is a good chance to build up the depleted runs, at least in the Sacramento River.

## TUNA

The tuna canning industry, next in size to the sardine industry, has also been seriously affected by the depression. The tuna canners, being all located in southern California, have been able to get together and curtail production. As practically all the canned tuna is sold in the United States, the tuna canners are in much better position than the sardine canners who have been selling most of their product in foreign countries. For these reasons, the tuna packers have entered the 1932 season in fairly good shape.

The season of 1930 was characterized by unprecedented catches of bluefin and yellowfin tuna. The bluefin catch exceeded 22,000,000 pounds, while the yellowfin catch slightly exceeded 56,600,000 pounds. The largest bluefin catch previous to this was in 1919 when 15,000,000 pounds were taken. The largest previous yellowfin catch was in 1929 when about 37,000,000 pounds were taken. A fairly large pack of striped tuna and bonito was also made. The result was a tuna pack which, under the existing conditions, was at least double what it should have been.

To avert disaster, the tuna packers agreed with the fishermen to maintain the existing prices which were being paid under a previous agreement, provided the fishermen would tie up their boats and take a holiday. All tuna fishing ceased on December 1, 1930. The market becoming stronger, fishing was resumed on February 1, 1931. A further lay-off of fishermen was agreed upon and fishing again ceased on May 1, 1931. This lay-off continued for some of the boats until July 1st, and for the balance until July 15th.

The essence of the agreement between the packers and fishermen was the maintenance of the prices being paid the fishermen for the different varieties of tuna. With a large carry-over of canned tuna from the previous season, this was necessary if the packers were to get their money back on the old pack. A number of the packers suspected that some of the other packers were secretly getting their tuna for less than the agreed price. It was claimed that in some cases the higher priced yellowfin tuna were received and paid for as the cheaper striped tuna. The packers thereupon held back one-third of the money due the fishermen until it could be determined if the price agreement had been kept. Fishermen have brought suit for the amount held back and the matter is still in the courts.

During the year 1931, the catch of all varieties of tuna was greatly reduced and, by the end of the year, the tuna pack had mostly been disposed of. The beginning of 1932 found the fishermen refusing to fish until they got their back pay and the packers offering less money for their tuna. After considerable lost time, new reduced prices were agreed upon and fishing was resumed. The fishermen failed to find the bluefin tuna in June of this year, as they usually do, and the catches of the other varieties have been small. The fishermen, especially bluefin fishermen, are in financial distress. The packers are in much better shape.

## OYSTERS

In our last report we told of the reviving interest in oyster culture in California and of how oyster experts, in a cursory survey of some of the State waters, had found that the native oyster, as well as the larger Japanese oyster, grows with extreme rapidity here as compared with the states to the north. It was also pointed out that, contrary to general opinion, there are a great many acres of tideland in the State suitable for the growing of oysters, and all that is needed to build up an oyster industry in the State is the employment of scientific methods which have been worked out by the U. S. Bureau of Fisheries and by some of the other states. Above all was needed the supervision and advice of a scientifically trained oyster expert.

Late in 1929 H. C. McMillin, one of the U. S. Bureau of Fisheries' biologists engaged in oyster investigations in Washington and Oregon, was able to give us some assistance while temporarily stationed at Stanford University. Paul Bonnot, one of our fisheries biologists, was detailed to work under McMillin's direction. During 1930 and most of 1931 only occasional days were devoted to oyster work. This work consisted of the inspection of seed oysters which were being imported from Japan and of observing and advising in the experiments with Japanese and native oysters at Elkhorn Slough on Monterey Bay.

Our State law requires that permission be obtained from the Division of Fish and Game to import marine plants or animals into the State for the purpose of propagation or planting in State waters, and that such plants or animals be inspected by the Division. There is one exception to these provisions and that is oysters. The great danger of introducing destructive oyster pests from Japan made it advisable to inspect these oysters, even if we had no authority. It was decided that we could compel the inspection of these shipments as

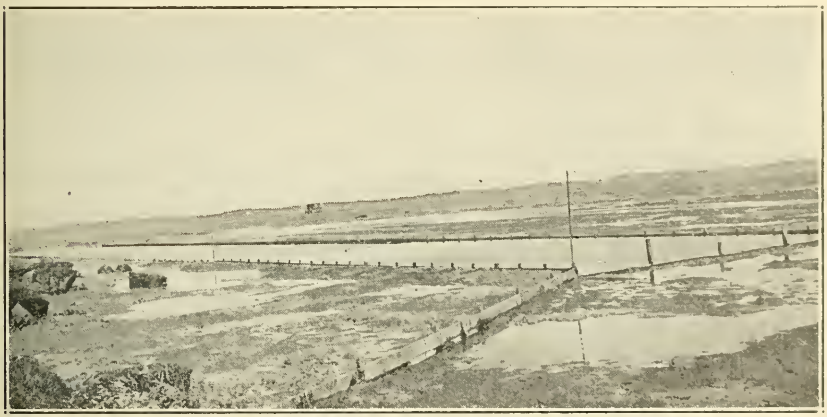

FIG. 20. Oyster seed dike, Humboldt Bay, California. Photo by Paul Bonnot, June, 1932.

they were sure to contain other forms than oysters for which inspection could be required.

From the beginning, the best of cooperation was had from the importers of Japanese seed oysters who, impressed with the danger of introducing foreign pests, have been only too glad to aid in the inspection. Only Tomales and San Francisco bays have been infested with exotic pests which were introduced with oysters shipped in past years from the Atlantic coast. By a rigid inspection, it is hoped that destructive pests can be kept out of the other bays.

At first, several of the lots of incoming Japanese seed oysters contained numerous exotic species but none of the most destructive Japanese oyster drills, a small mollusk which feeds on oysters. On March 7, 1930, a shipment arrived which carried not only drills but many of their egg cases. This lot was destroyed. Since that time the growers in Japan have been much more careful to keep the seed off the botton and free of the pests; and in the shipments received in the

past two years a careful search has revealed only a few harmless gastropods.

In September, 1931, the U. S. Bureau of Fisheries, at our request, detailed Mr. McMillin to California to put in full time on oyster work under cooperative agreement whereby the Division of Fish and Game was to pay Mr. McMillin's field expenses and furnish a trained biologist as an assistant. Mr. Bonnot, who had been acting in this capacity, was detailed as assistant. Since that time these men have put in full time on the oyster work. A preliminary survey was made of all the bays and inlets of the coast to determine which were suitable for the several species of oysters being grown, as well as to determine which were unsuitable for any of the species. This work consisted of collecting topographical data, salinity and temperature records and examination of the molluscan fauna. They were then in position to help the established oyster men and the beginners. Preliminary experiments were started in all of the bays of California which were considered suitable for oyster culture.

Humboldt Bay was believed to have the best possibilities for the cultivation of native oysters. It has beds of wild native oysters and most of the bottom is suitable for diking, a method not as yet tried in California. The eastern half of the bay has been condemned by the State Board of Health because of sewage from the towns of Arcata and Eureka. The western half, however, is clear and sanitary. The beds of wild native oysters are most of them in polluted areas but the seed can be collected and transplanted to the unpolluted areas. It is hoped that cities will in time dispose of their sewage other than by letting it flow, untreated, into our bays and streams.

The native oyster grows best and the best set of seed is obtained by using the diking system, so, under the supervision of the oyster investigation, a newly formed oyster company, which has filed on much of the tideland of north Humboldt Bay, has built several experimental dikes, both for the collection of seed and for growing the oysters which have been moved to unpolluted areas. One of these dikes is 120 by 240 feet, is in unpolluted water, and is being used as a base for the diking of a much larger area. One smaller dike was built this spring for the collection of seed. In June the oysters were spawning and in early July shell collectors in this dike showed a heavy set of seed.

Attempts to plant other than the native species in Humboldt Bay have been discouraged, as it is believed that the native species will stand the natural environmental changes better; that the bay can more easily be kept free from pests and that the native oyster will be more profitable in the long run.

### SPINY LOBSTERS

The amount of spiny lobsters landed each year in southern California ports has remained fairly constant for the past fourteen years, since the present closed seasons and size limits were adopted. The amount landed each year fluctuates between 1,000,000 and 1,400,000 pounds. The present laws, adopted in 1917 for the protection of this important crustacean, seem to be adequate. The closed season, which begins on March 1st, is for the purpose of protecting the lobsters while they are shedding their shells and while the females are carrying the

eggs, attached to the swimmerets on the underside of the tail. The season remains closed until October 15th. The season could open earlier than October 15th as far as the conservation of lobsters is concerned, but it was thought best to keep the season closed until the more rigorous weather of the late fall, so as to discourage what are termed "fair weather fishermen," who would otherwise deprive the regular experienced winter fishermen of the benefit of the higher prices at the opening of the season.

The law also provides that lobsters may be brought in from Mexico during our closed season, if they come in under inspection and are marked so that we may be sure they are not from our own local waters. For a number of years Mexico has had the same season as ours, but in 1931 Mexican officials permitted their season to open on October 1st, or 15 days in advance of ours. The Mexican lobsters thus got the advantage of the higher opening prices. When our season opened on October 15th, the market had been weakened and our fishermen were the losers. That part of our law which exempts imported lobsters from its restrictions as to seasons should be repealed.

### MACKEREL

The mackerel catch for the State, which had risen in three years from about 5,000,000 pounds to 60,000,000 pounds in 1929, dropped to 16,500,000 pounds in 1930 and to 14,200,000 pounds in 1931. This was due to poor marketing conditions.

### CAT AND DOG FOOD

In 1931 certain fish packers in southern California started canning a product for feeding cats and dogs. This product is composed of good cooked fish mixed with a cooked cereal. Over 40,000 cases of this product were packed.

### EARLY LIFE HISTORY STUDIES OF THE SARDINE

The hydrobiological survey of Monterey Bay, a cooperative enterprise entered into by the Division of Fish and Game and the Hopkins Marine Station of Stanford University, has been continued since January, 1929. A full description of this survey is to be found in the January issue of California Fish and Game for the year 1930. Since that time much work has been done on the complex changes which take place in the waters of the bay. The knowledge thus gained will give us an understanding of the changes in fish population in the bay. Dr. Tage Skogsberg of the Hopkins Marine Station is in charge of the survey. Eugene C. Scofield, a fisheries research worker of the Division of Fish and Game, is assisting and is in charge of the part of the program which has to do with the study of the spawning of the sardine and its early life history. The ultimate aim of this part of the sardine investigations being carried on by the Division of Fish and Game is to learn why, on occasional years, the spawning of the sardines is so successful that the fish resulting greatly outnumber the other sardine age or year groups. The group resulting from such a successful spawning is called a dominant year group.

It is intended that these investigations will establish a basis of estimating the relative success or failure of each year class two or three years before it enters the commercial catch. Such a knowledge, which will be very valuable to the fisheries industry, it is reasonably sure can be obtained through the determination of the relative abundance from year to year of the very young sardines, or larvae, as they are called. This relative abundance is to be established by the employment of specially constructed plankton nets operated quantitatively at key stations throughout the sardine spawning and nursery grounds.

Because of the magnitude of the problem, the investigations of the past years have been devoted to three major studies: (1) The determination of the spawning area, (2) defining the area of maximum spawning, and (3) establishing the constancy of these two areas from year to year. Related secondary problems, such as the development of the eggs, also the food, drift and rate of growth of the larvae, were carefully considered, and all were studied whenever material was available.

In the pursuit of these major problems, approximately 15,000 miles of station lines were run, covering an area of about 252,000 square miles of ocean. The region covered lies between Eureka on the north and Cape San Lucas, Baja California, on the south. Between Eureka and San Diego, the entire body of water out to 400 miles was covered by station lines. In the remainder of the region visited, the exploratory work was confined to the proximity of the coast.

As a result of the intensive work of these past four years (1929 to 1932), it is felt that the three major problems, as stated, are now generally understood. With the exception of a few details, 1933 will mark the beginning of an actual count of the relative abundance of sardine larvae, these data to be used in predicting the fluctuations in abundance of commercial sizes.

A bulletin covering these preliminary findings is now ready for printing and should be issued during 1933. This publication covers three main results:

(1) *Spawning region.* The major spawning area is a comparatively small region approximately 200 miles in diameter. From the United States-Mexican international boundary to Point Conception and offshore to 200 miles are the bounds of this limited area.

The California sardine ranges for 2000 miles up and down the Pacific coast between southern Alaska and the Gulf of Lower California. They have never been seen or known to occur further than 200 miles from land. The fact that the great bulk of these sardines migrate each year to a centralized area for the purpose of spawning is perhaps the most important discovery of this investigation.

(2) *Time of spawning.* The sardine eggs are found in the open ocean in small numbers during February. They steadily increase in numbers until April and May when they occur in greatest abundance. By August the spawn has about disappeared.

(3) *Drift of the larvae.* The sardine eggs hatch in three days. As small larvae they are completely helpless and subject to drift. As a result of currents, the major portion of these larvae are set to the

south and finally inshore along the coast of Baja California and southern California. Here is situated, then, the nursery grounds of the young sardine which are commonly used as bait and as "quarter oils" for packing.

PATROL

The enforcement of the commercial fisheries laws at the principal fishing centers, Monterey, San Pedro and San Diego, has been carried on by the Bureau of Commercial Fisheries. It was deemed best to have this special patrol for the commercial fisheries conducted by this bureau in order that we might more readily understand the fisheries and their many problems—problems which are not only connected with law enforcement but with the conservation of the fisheries. To make this connection as close as possible, branch offices were established at these fishing centers from which the local patrolmen are directed, statistics of the fisheries are gathered, fishing licenses are sold and fishing boats and gear registered.

The plan of the organization was to connect intimately the research and law enforcement activities of the bureau. It is necessary in the administration of the fisheries to get much of the information on which conservation measures are based from the patrolmen in the field, who have an intimate firsthand knowledge of the fishing methods, as well as the methods of the canners and fish dealers. In the fishing areas other than the three mentioned, the fisheries patrol is carried on by the Bureau of Patrol and Law Enforcement, whose activities are principally game patrol. Commercial patrolmen from the three branch offices cover most of the coast from Santa Cruz to the Mexican border. The sea patrol is carried on by the *Bluefin*, working out of San Pedro, and the *Albacore*, working with Monterey as its base.

During the past biennial period, the personnel of the commercial patrol has remained the same except for the following changes: In September, 1930, H. B. Nidever, who was acting as supervisor of fisheries patrol at San Pedro, was given a special detail to cover the fisheries of the State from San Francisco to Eureka and the Klamath River, for the purpose of creating a better contact with the northern fisheries, and more especially to bring about a better registration of boats and fishing gear, and to straighten out and keep straight the collection of the statistics of the fisheries. S. H. Lyons assumed the duties of supervisor of fisheries patrol. T. J. Smith was appointed patrolman to assist in the San Diego district under Captain C. F. Maddox. No changes were made in the patrol force in the San Pedro district, except that Captain C. H. Groat, in charge, was appointed assistant to S. H. Lyons in order that he might act for the supervisor in the San Diego and Monterey districts. At Monterey, where the patrol is under Captain Ralph Classic, patrolman Noah Matthews resigned and his place has not been filled, as the crew on the *Albacore*, stationed at that place, has been available for shore patrol when occasion demanded.

During the sardine seasons, a large additional temporary force of cannery inspectors has been taken on at the sardine fishing centers. The work of cannery inspection has been described under the subject

of Sardines. These inspectors have been available for other patrol work than cannery inspection during a good part of each year.

The duties of the patrol force at San Pedro and San Diego have been greatly increased during the past two years by the passage of the new laws by the last Legislature. A closed season and size limit were placed on white sea bass; minimum and maximum size limits were placed on albacore, bluefin and yellowfin tuna and a minimum limit on skipjack. Santa Monica Bay and a district at San Juan Capistrano Point were set aside as territory where netting is prohibited. To enforce these new laws entailed much extra work with only one additional patrolman to do it. The size limit law placed on the different species of tuna made it necessary for our deputies to meet all incoming tuna boats and remain at the canneries during the time the fish were unloaded. A great deal of work was also necessary in the enforcement of the minimum size law on barracuda and the law which prohibits anglers from having in possession more than five undersized barracuda.

For some reason, the tuna fishermen, many of them, believed that the tuna size limits would not be enforced during the latter part of the 1931 season, just after the law went into effect, and many fish both over- and undersized were brought in from the long trips south of the international boundary line. It was considered sufficient penalty for the fishermen to lose these fish and they were not prosecuted. During the season of 1932 so far, the violations of the tuna size limit laws have been very greatly reduced. A number of the fishermen and one canner have been prosecuted.

Good work has been done by all deputies in seeing that all boats are properly registered and numbered by this bureau, and in checking up all fishermen for commercial fishing licenses.

It has been the policy of this bureau to, as far as possible, get the cooperation of fishermen in getting just conservation laws passed and in enforcing them. Patrolmen are not rated on the number of arrests they make, and by this policy we have gained the confidence of most of the fishermen. H. B. Nidever, while supervisor of fisheries patrol, put into practice a system taken from a similar one used by the Royal Canadian Mounted Police, under which patrolmen reported violations of the law where arrests were not made. These we called "nonprosecution cases." This system was adopted as an experiment but it has worked out so well we believe it should be used by all enforcement officers of the Division. Patrolmen hesitate to report all nonprosecution cases, but this hesitancy would be overcome if the system were officially adopted. Reports in such cases would give the supervising officer information as to whether any patrolman is too severe or too lenient in handling his cases.

It is interesting to note that the Michigan Department of Conservation has adopted a similar system, in which "Apprehension Reports" are made. In their Monthly Bulletin for March, 1932, we learn that, just as we have done, they are attempting to distinguish between deliberate violations and those which are unintentional and done through ignorance of the law. It is stated in their bulletin that this system was put into effect in 1931 and has reduced the number of court cases 22 per cent. In justification for this system, it is stated

that many of the violations are petty and would not be repeated, and that this attempt is to enhance the "educational aspect" of the work of the department.

The patrol boat *Bluefin* has been kept very busy on patrol and has devoted a considerable portion of her time during the two years on trips for the Hydrobiological Survey in its studies of the early life history of the sardine, which has been previously described.

The *Bluefin* is a new 86-foot vessel, powered with a 200 h.p. diesel Atlas Imperial engine. She is in charge of Captain Walter Engelke and has a crew of five men. Due to the limited amount in our budget for the purpose, she was not fully equipped when she was built early in 1930. Since then she has been provided with rolling chocks, as her excessive rolling had caused the large fuel tanks to spring leaks at their fastenings. The tanks have been rewelded and additional baffles installed to prevent surging. Recently a contract was let for a good wireless set, to be installed by the middle of August.

The patrol boat *Albacore*, formerly at San Pedro, was moved to Monterey after a thorough overhauling, where, under Captain L. J. Weseth and a crew of three, she is employed in patrolling the coast from San Luis Obispo to Sonoma County. She also puts in part of one day a week on a trip for the hydrobiological survey of Monterey Bay, previously described.

# REPORT OF THE CALIFORNIA STATE FISHERIES LABORATORY

W. L. Scofield, Director

The research program of the California State Fisheries Laboratory is primarily a determination of the changes in abundance of our most important species of commercial fishes so that the need for protective legislation can be demonstrated in such fisheries as are shown to be suffering from the strain of over-fishing. Life history and economic information aid in determining the effectiveness of protective measures recommended or of those already enacted as laws.

## SARDINES

Our most important fishery is that for sardines as the tonnage delivered is more than twice that of all our other fisheries combined. A major portion of the laboratory program has been a thorough study of the extent of the sardine population, changes in the abundance, variations in the character and composition of the catch, extent and locality of spawning, growth and mortality rates, and the movements of sardines along our coast. Encouraging progress toward definite conclusions has been made during the past two years and reports of the findings are now being prepared. The uniformity of the population along our coast line, resulting from a comparatively restricted spawning area, is of outstanding importance as indicating that protective legislation should be state-wide in application and that depletion in any one area would lessen the supply in other regions. Our work has shown what may be considered the first danger signs, indicating a heavy drain on the supply, but serious depletion of the supply can not be demonstrated until it occurs.

## MACKEREL

The mackerel fishery became prominent about four years ago, and life history work on this species was started to learn age, rate of growth, age at sexual maturity, frequency of spawning and such other facts as will serve as a basis for possible future legislation. A study of the fishery has been made to record the gear used, methods of operation, localities fished, and such other information as will be helpful in an analysis of fluctuations in abundance. Satisfactory progress has been made except for the disappointing lack of material for determining the localities and abundance of spawning.

## CALIFORNIA HALIBUT

A study of the abundance of the California or southern halibut was completed, showing a steady lessening in the supply. Our recommendations as to the need for and kind of protective measures were adopted by the State Legislature.

### BLUEFIN TUNA

An analysis of the boat catches of bluefin tuna demonstrated the fact that the supply was meeting the needs of this fishery without showing signs of exhaustion.

### MISCELLANEOUS STUDIES

A variety of special investigations are carried out by the laboratory staff for the purpose of supplying information to members of the Legislature, to men engaged in the fish trades, and as aids to the administrators of our fisheries. An example of such studies is our determination of the relative effectiveness and destructiveness of the several types of nets used in sardine fishing.

### FISHERIES STATISTICS

During the past two years a system was adopted by which the fisheries catch records are transferred from the original ticket receipts to punched cards, which are arranged and recorded by machine. This allows of more complete reports and makes readily available much information from the records that in past years was seldom obtained because of the high clerical cost. The adoption of this system of handling the records necessitates a number of changes which have improved the quality of our statistics. The adoption of a State serial number for fishing boats has eliminated most of the confusion as to the identity of fishing boats, and the designating of official common names for species of fishes has improved the accuracy of our records. The complete reports obtainable by this punched card system will be increasingly valuable in the future as they are used in studies of changes in the abundance of our fishes.

### LIBRARY

The policy of rigid selection of library material has been continued and has resulted in building up a set of reference publications of relatively small bulk but of a high degree of usefulness, so that the library is of the greatest service to the staff members. The library is gaining recognition by men interested in our fisheries, and the number of citizens taking advantage of our library service has greatly increased during the last two years.

### PUBLICATIONS

Staff members have been frequent contributors to the quarterly magazine, California Fish and Game, and have prepared occasional articles for publication in the two Pacific coast trade journals, *Pacific Fisherman*, and *West Coast Fisheries*. Major reports presenting the research work are printed as Fish Bulletins. Fourteen such bulletins were completed during the biennial period, 1930–1932, of which eight were distributed, one is now in process of printing and five are awaiting printing.

The bulletins issued were as follows:

No. 30. The commercial fish catch of California for the year 1929. By the staff of the Bureau of Commercial Fisheries. 133 pp., 75 figs.

No. 31 Studies of the length frequencies of the California sardine (*Sardina caerulea*). By the California State Fisheries Laboratory. 53 pp., 24 figs.
No. 32. The California halibut (*Paralichthys californicus*) and an analysis of the boat catches. By. G. H. Clark. 52 pp., 25 figs.
No. 33. Fishing methods for the bluefin tuna (*Thunnus thynnus*) and an analysis of the catches. By S. S. Whitehead. 32 pp., 22 figs.
No. 34. Salmon of the Klamath River, California. By J. O. Snyder. 129 pp., 44 figs.
No. 35. A distributional list of the species of freshwater fishes known to occur in California. By Barton W. Evermann and Howard W. Clark. 67 pp.
No. 36. A bibliography of the sardines. By Genevieve Corwin Wheeler. 133 pp.
No. 38. The California shrimp industry. By Paul Bonnot. 20 pp., 11 figs.

Fish Bulletin No. 37, now in press, is "The California barracuda (*Sphyraena argentea*)," by Lionel A. Walford.

The five completed reports now awaiting printing deal with the following subjects: No. 39 is an analysis of sardine sizes in the commercial catch as determined by type of fishing gear and localities of catch. No. 40 is a bibliography of the mackerels, compiled by Genevieve Corwin Wheeler. No. 41 is a presentation of the common names adopted for the sharks, rays and skates with photographs and brief descriptions to serve as a handbook of these fishes. The author is Lionel A. Walford. No. 42 is a technical account of the histological development of sardine eggs, by C. B. Andrews. No. 43 presents the findings as to sardine egg growth and spawning resulting from egg measurements, by Frances N. Clark.

## REPORT OF LEGAL BUREAU

EUGENE D. BENNETT, Attorney

The work and activities of the legal bureau of the division may be summarized as follows:

(a) The rendition of legal advice and opinions to the Fish and Game Commissioners, their staff and field force, as well as to sportsmen and commercial interests, and to the public generally concerning fish and game laws. The division counsel is continually called upon to interpret the various fish and game laws for the public generally and upon the request of district attorneys throughout the State.

(b) The preparation and approval of leases and agreements for the leasing or acquisition of game refuges, bird sanctuaries, hatcheries, egg taking stations, etc.; also agreements of sundry character in which the commissioners are parties.

(c) The defense of all actions instituted in the Federal and State courts against the Fish and Game Commissioners, their staff and employees, for and on account of acts arising out of their official duties.

(d) Prosecution of civil actions in the superior courts to enjoin public nuisances which arise from the pollution of waters, the maintenance of dams without fish ladders, the diversion of waters without fish screens, as well as the prosecution of other civil actions required for the preservation and protection of fish and game, as well as the operative property of the division. These actions are instituted in the name of the People of the State of California and are, therefore, brought in conjunction with the office of the Attorney General. The attorney for the division, however, appears as counsel of record in these cases and actually handles the preparation and the trial thereof.

(e) Prosecution of criminal cases in the justices' or police courts throughout the State involving violations of fish and game laws where special issues of importance are involved, or upon appropriate request by district attorneys. In the usual misdemeanor case, the deputy fish and game commissioner presents the case. Where a jury has been demanded, or where facts surrounding the case present some unusual features, counsel for the division appears. Thirteen of these cases were prosecuted by the division counsel during the biennium.

From time to time the legal bureau of the division is also called upon to resist applications for writs of habeas corpus.

(f) Under section 636*a* of the Penal Code it is the duty of the division to institute proceedings of condemnation of nets seized by violation of the fish laws. These actions are brought in the superior courts. In compliance with this section the commission started one hundred and sixty-eight separate proceedings. In each instance, except as to those cases now pending, judgment of condemnation was obtained.

(g) In accordance with various fish and game statutes the division is obliged to conduct and hold hearings to determine facts incidental to the regulation of fish and game; such as the necessity of fish screens

or fish ladders, the propriety of issuing permits, and so forth. At these hearings the division is represented by its counsel.

The following is a resume of the major cases handled by the legal department during this biennium:

UNITED STATES SUPREME COURT

*Noack et al.* vs. *Zellerbach et al.* This was an action instituted in the United States District Court at San Francisco to enjoin the Fish and Game Commissioners and their deputies from interfering with the operations of plaintiffs in transporting fresh salmon, alleged to be caught on the high seas, over and across the sea fish and game districts adjacent to the California coast during the time that the taking or possession of fresh salmon within such districts is prohibited. The action was predicated on the theory that the salmon law (section 634 of the Penal Code), was repugnant to the federal constitution for various reasons. The district court, sitting with three federal judges, upheld the position of the commissioners and denied Noack and his fellow plaintiffs relief.

From this decision the fishermen took an appeal to the United States Supreme Court, which court affirmed the decision of the lower court.

UNITED STATES DISTRICT COURT

*Hazel-Atlas Glass Company of California* vs. *Stewart Curtis Packers, Inc.* On the application of the plaintiff a receiver has been appointed to carry on and conduct the affairs of the defending packing company. The Division of Fish and Game is a claimant for unpaid privilege taxes due for shipments of albacore from Japan, the sole question being whether or not the tax constitutes a burden on imports in violation of the Federal Constitution. The matter was presented before a special master in equity appointed by the court and has been briefed and submitted for decision.

SUPREME COURT

*People* vs. *Glenn Colusa Irrigation District.* This is an action instituted by the division in the Superior Court of Glenn County to enjoin the defendant district from diverting water from the Sacramento River into its irrigating ditches until such time as it installs a fish screen at the intake thereof in accordance with the order of the division. The case was tried before Superior Judge H. S. Gans of Red Bluff at Willows, the trial commencing on May 19, 1930. Thereafter a judgment was rendered in favor of the plaintiff in which the irrigation district was enjoined from diverting any water from the Sacramento River after April 1, 1932, until a fish screen, as ordered by the Fish and Game Commission, was installed. The defendant district took an appeal to the Supreme Court, where the matter is now pending.

*Svenson* vs. *Engelke et al.* This suit (similar to *Noack* vs. *Zellerbach, supra*) was commenced in the Superior Court of Humboldt County by a group of Eureka fishermen to prevent the division and its deputies from arresting and interfering with them while bringing

fresh salmon caught on the high seas over and across the closed sea areas off Humboldt County into the City of Eureka. The court granted a preliminary injunction, from which the division appealed. The Supreme Court affirmed the preliminary injunction, upon its interpretation of the statute, to the effect that the possession within closed districts of fish caught upon the high seas was authorized by a proviso in the statute. At the next session of the Legislature, by an urgency measure, the statute involved (Penal Code section 634) was amended so as to expressly prohibit the possession of salmon in the closed districts irrespective of the place where caught. Thereafter the case was tried on its merits before the Superior Court at Eureka, and this time judgment was rendered in favor of the commissioners. From this judgment the plaintiff fishermen appealed to the Supreme Court, where the matter is now pending.

*Means* vs. *Kayser.* This is a petition for a rehearing in the Supreme Court (which petition the Supreme Court granted) following denial by the District Court of Appeal of a petition for certiorari to review an award of the Industrial Accident Commission holding the Division of Fish and Game liable for compensation due Means for injuries incurred while acting as an inspector of the seining operations with one Kayser, a commercial fisherman, at Ellis Lake, Marysville, California. Means' wages were being paid by Kayser and the division contended that he was Kayser's employee. The Industrial Accident Commission held, however, that Means was an employee of the division rather than of Kayser. The matter has been briefed, argued and is awaiting decision.

*People* vs. *K. Hovden Company.* This was an action commenced in the Superior Court of Monterey County to prevent the defendant from using sardines in its reduction plant in excess of the amount allowed by law, and to close its plant for a period of one year. The case was tried before Judge H. S. Jorgenson of Salinas and judgment rendered in favor of the plaintiff. The judgment contained an order closing the reduction plant of the defendant for a period of one year. From this judgment the defendant fish canning company appealed, but the Supreme Court affirmed the judgment of the lower court. This is the first case wherein the abatement provisions of the Sardine Reduction Act have been applied and upheld by the Supreme Court of this State.

*Noack et al.* vs. *Zellerbach et al.* This action was commenced in the Superior Court of Marin County for an injunction to prevent the commissioners from interfering with the salmon fishing operations of the plaintiffs. In all respects it is similar to *Svenson et al.* vs. *Engelke et al., supra.* A demurer to the complant was sustained without leave to amend by Judge Edward I. Butler, from which plaintiff fishermen appealed to the Supreme Court. This appeal has not been further prosecuted by the appellants.

### DISTRICT COURT OF APPEAL

*Bayside Fish Flour Company* vs. *Zellerbach et al.* This was an appeal from a judgment in favor of the commissioners by the Superior

Court of San Francisco denying the application of the fish flour company for a writ of mandate to compel the issuance of a permit to reduce sardines to fish flour for an unlimited period of time. The District Court of Appeal affirmed the judgment of the lower court.

*Bayside Fish Flour Company* vs. *Zellerbach et al.* An original application for mandamus which was made to the District Court of Appeal to secure a permit similar to the one sought in the preceding action. The petition was denied on the ground that it antedated the taking effect of the amendments to the statute upon which the petition was primarily predicated.

*In re Frank Vitalie.* This was an application for a writ of habeas corpus in the District Court of Appeal for the Third District to secure petitioner's release from arrest for a violation of the provisions of section 628*a* Penal Code (the so-called Cronin Act, passed in 1931, and which prohibited the netting of striped bass). This action was the first test of the validity of the act, which the court upheld by a sweeping decision in which the application for the writ was denied.

SUPERIOR COURT

*People* vs. *Cain Irrigation Company.* This action was commenced in the Superior Court of Mono County to enjoin the defendant from diverting water from Rush Creek into its irrigating ditches until such time as fish screens are installed. Trial of this and two following cases is being deferred on account of the anticipated taking over of these properties by the City of Los Angeles, which will result in a voluntary abatement of these nuisances.

*People* vs. *Cain Irrigation Company.* This case is similar to the previous case with the exception that the installation of a fish ladder is involved instead of fish screens.

*People* vs. *Cain Irrigation Company.* This case comes to the superior court on appeal from the judgment of conviction in the justice court at Bridgeport, Mono County. The defendant was convicted of wilful and unlawful failure to install a fish ladder to permit fish to pass over and around its dam at Grant Lake. The defendant has agreed to pay the fine and dismiss its appeal if the pending negotiations with the City of Los Angeles are completed.

*Uhden et al.* vs. *McDermott et al.* This action is similar to *Noack* vs. *Zellerbach, supra,* except it was commenced in the superior court at Santa Cruz by a group of fishermen of that locality. After the statute was amended at the 1931 session of the Legislature. a motion was made to dissolve the temporary injunction heretofore granted against the commissioners, which motion was granted and no further action has been taken in the case.

*Loew* vs. *Carpenter et al.* This is an action commenced by the owner of 270 live geese for an injunction to prevent the seizure thereof by deputies of the Fish and Game Commission. The geese are used as decoys. The case is still pending.

*Barnes* vs. *Dept. of Natural Resources et al.* This is a mandamus action commenced by a former deputy of the division in the Superior

Court of Humboldt County to recover the sum of $750, alleged to be due for past salary and expenses. The division secured change of venue of the action to San Francisco County, and since then plaintiff has not taken further steps to prosecute the case. The matter is still pending.

*People* vs. *Hutchinson et al.* This action was commenced in the Superior Court of Sacramento County to enforce the installation of a fish ladder to permit fish to pass over and around the dam of defendants on the Cosumnes River. After a hearing in the matter judgment was rendered for the plaintiff and the defendants were ordered to install a ladder. Subsequently they did so. But the construction provoked the question as to whether or not the ladder would serve the purpose and pass fish over the dam. On an order to show cause why the defendants should not be adjudged in contempt of court, the matter was postponed by Judge Malcom C. Glenn of Sacramento until the next rainfall and attending run of salmon would offer more positive proof concerning the efficacy of the ladder as constructed.

*People* vs. *Stangero.* This case came to the superior court on appeal from the judgment of conviction in the justice court at San Luis Obispo. The superior court affirmed the judgment.

*Noack et al.* vs. *Zellerbach et al.* This is an action against the commissioners and certain of their deputies, in which the plaintiffs seek to recover seventeen thousand seven hundred fifty dollars ($17,750) damages for the alleged wrongful seizure of salmon and attending loss of profits by threats of further arrests. This case is an aftermath of the salmon injunction cases referred to hereinabove. The case is set for trial on September 6, 1932.

*John A. Peters* vs. *Mansfield Joy et al.* This is an action commenced in the Superior Court of Marin County for twenty thousand eight hundred and fifty dollars ($20,850) damages against the commissioners and certain deputies for alleged false imprisonment. Like the previous case, it is the aftermath of the salmon injunction cases noted hereinabove. The matter is still pending.

*Frank Peters* vs. *Mansfield Joy et al.* Similar to previous case; amount of damages claimed $20,600.

*Paul J. Trouette* vs. *Mansfield Joy et al.* Similar to previous case; amount of damages claimed $20,850.

*Louis Peters* vs. *Mansfield Joy et al.* Similar to previous case; amount of damages claimed $20,850.

*People* vs. *Wattenburg et al.* This action was instituted by the Division in the Superior Court of Mendocino County to enjoin the defendants from interfering with the flow of water in Cold Creek to the fish hatchery located thereon. The case involved an interpretation of the terms of a lease entered into between the division and defendants Wattenburgs some years ago in which the Wattenburgs agreed to furnish the State with enough water to operate the hatchery. After a trial of the matter the court decided that the Wattenburgs should be enjoined from diverting more than half the water in Cold Creek for their own use and should leave the balance for use of the State.

*People* vs. *Prather.* This was an action instituted by the division in San Francisco to recover from Willis H. Prather, former county clerk of Mendocino County, and his official surety $8,628.48, representing an amount due and unpaid from the sale of hunting and angling licenses in Mendocino County during 1928–1929, which the defendant Prather failed to account for. The surety company contested the case but judgment was rendered in favor of the plaintiff. The sum of $5,000 was recovered from the surety company representing the amount of the bond. The balance is covered by the judgment against Prather himself and is yet unpaid.

*People* vs. *Bayside Fish Flour Company.* This was an action commenced by the division to prevent the defendant from operating a fish reduction plant on Monterey Bay without a permit required by the Fish Reduction Act. Defendant contended that permit previously issued was continuing in effect and consequently no new permit was needed. The court, however, took a contrary view and sustained the contention of the plaintiff. Pending final disposition of the action, the defendant complied with the provisions of the Act and a permit was issued to it. The case was then dismissed for the reason that the questions therein had become moot.

*Boyd* vs. *Zellerbach et al.* This was an action for mandamus to secure the issuance of a fish packer's license. The action was started in Ventura County and a motion to change venue was granted. Thereupon the petitioner dismissed the case without prejudice.

*Boyd* vs. *Zellerbach et al.* This action was commenced in the Superior Court of Santa Barbara County and was similar to the previous case. The writ sought was granted.

*People* vs. *Ventura Packing Corporation.* This was an action commenced in Ventura County to enjoin the defendant (the canning plant involved in the *Boyd* case, *supra*) from using an excessive amount of sardines in its reduction plant. After trial the defendant was enjoined from using sardines in excess of the amount authorized by law.

*Noack et al.* vs. *Zellerbach et al.* This was an action brought in the Superior Court of the City and County of San Francisco for injunction similar to the salmon injunction cases noted hereinabove. After plaintiffs' motion for preliminary injunction was denied, the case was dismissed by the plaintiffs without prejudice and filed anew in Marin County. See *Noack et al.* vs. *Zellercach et al., supra.*

*Molera* vs. *Hyatt.* This was an action commenced in the Superior Court of Monterey County by a property owner near the outlet of the Salinas River. The suit sought to enjoin the State engineer from proceeding to dredge an old channel formerly connecting the Salinas River with Elkhorn Slough. At the request of the Attorney General, counsel for the Division of Fish and Game appeared as one of defense counsel. The court decided that the channel by accretion had become private property and that the proposed operations would constitute a violation of the rights of the property owners and upon such grounds ordered judgment restraining further dredging operations. Findings have not yet been presented to the court by the plaintiffs.

*Warnock* vs. *Hyatt.* Similar to previous case.

*Western California Farms* vs. *Hyatt.* Similar to previous case.

*Vierra* vs. *Hyatt.* Similar to previous case.

MUNICIPAL COURT (San Francisco)

*Anderson* vs. *Zellerbach et al.* This is an action for damages instituted by fisherman Anderson against the commissioners and certain deputies for an alleged wrongful detention of nets. The case is awaiting trial.

JUSTICE COURT

*Noack* vs. *Joy et al.* This was an action instituted in the justice court at Sausalito against certain officers of the division to recover $165 damages for alleged wrongful seizure of a boatload of salmon. The action is awaiting trial.

# APPENDIX

## STATISTICAL REPORTS

## RECEIPTS AND MISCELLANEOUS COLLECTIONS JULY 1, 1930, TO JUNE 30, 1931

### 82d Fiscal Year

| | Division of Fish and Game | County clerks | Total |
|---|---|---|---|
| Hunting, 1929 | $100 00 | | $100 00 |
| Hunting, 1930 | 238,912 00 | $201,030 70 | 439,942 70 |
| Hunting, 1931 | 12,250 00 | 12,092 00 | 24,342 00 |
| Angling, 1929 | 450 00 | | 450 00 |
| Angling, 1930 | 219,567 00 | 209,635 50 | 429,202 50 |
| Angling, 1931 | 56,520 00 | 19,591 00 | 76,111 00 |
| Deer tags, 1930 | 60,269 00 | 63,730 00 | 123,999 00 |
| Market, 1930-31 | 29,680 00 | | 29,680 00 |
| Market, 1931-32 | 27,220 00 | | 27,220 00 |
| Trapping, 1930-31 | 2,855 00 | 5 00 | 2,860 00 |
| Game breeders, 1930 | 142 50 | | 142 50 |
| Game breeders, 1931 | 882 50 | | 882 50 |
| Fish breeders, 1930 | 25 00 | | 25 00 |
| Fish breeders, 1931 | 435 00 | | 435 00 |
| Fish importers, 1930 | 10 00 | | 10 00 |
| Fish importers, 1931 | 75 00 | | 75 00 |
| Fish packers, 1929-30 | 5 00 | | 5 00 |
| Fish packers, 1930-31 | 1,125 00 | | 1,125 00 |
| Hunting club, 1930-31 | 2,110 00 | | 2,110 00 |
| Hunting club operators, 1930-31 | 620 00 | | 620 00 |
| Kelp, 1931 | 30 00 | | 30 00 |
| Total license sales | $653,283 00 | $506,084 20 | $1,159,367 20 |
| | | Judges | |
| Fish packers' tax | $122,103 29 | | $122,103 29 |
| Kelp tax | 152 78 | | 152 78 |
| Fish tag sales | 2,817 37 | | 2,817 37 |
| Game tag sales | 104 28 | | 104 28 |
| Interest | 5,861 72 | | 5,861 72 |
| Importers' contributions | 150 00 | | 150 00 |
| Miscellaneous income | 376 05 | | 376 05 |
| Court fines | | $68,178 78 | 68,178 78 |
| Total miscellaneous collections | $131,565 49 | $68,178 78 | $199,744 27 |
| Total income | $784,848 49 | $574,262 98 | $1,359,111 47 |

## RECEIPTS AND MISCELLANEOUS COLLECTIONS JULY 1, 1931, TO JUNE 30, 1932

### 83d Fiscal Year

| | Division of Fish and Game | County clerks | Total |
|---|---|---|---|
| Hunting, 1929 | | $523 68 | $523 68 |
| Hunting, 1931 | $237,509 00 | 161,865 90 | 399,374 90 |
| Hunting, 1932 | 3,826 50 | 1,251 00 | 5,077 50 |
| Angling, 1928 | | 2,104 32 | 2,104 32 |
| Angling, 1929 | | 2,383 80 | 2,383 80 |
| Angling, 1931 | 264,861 00 | 155,418 00 | 420,279 00 |
| Angling, 1932 | 63,545 00 | 43,423 00 | 106,968 00 |
| Deer tags, 1931 | 69,360 00 | 59,645 00 | 129,005 00 |
| Deer tag, 1932 | 1 00 | | 1 00 |
| Market, 1931-32 | 29,290 00 | | 29,290 00 |
| Market, 1932-33 | 25,950 00 | | 25,950 00 |
| Trapping, 1931-32 | 2,858 00 | | 2,858 00 |
| Game breeders, 1931 | 130 00 | | 130 00 |
| Game breeders, 1932 | 877 50 | | 877 50 |
| Fish breeders, 1931 | 85 00 | | 85 00 |
| Fish breeders, 1932 | 445 00 | | 445 00 |
| Fish importers, 1931 | 15 00 | | 15 00 |
| Fish importers, 1932 | 95 00 | | 95 00 |
| Wholesale fish packers, etc., 1931-32 | 1,285 00 | | 1,285 00 |
| Commercial hunting club, 1931-32 | 1,375 00 | | 1,375 00 |
| Commercial hunting club operators, 1931-32 | 345 00 | | 345 00 |
| Kelp, 1931 | 10 00 | | 10 00 |
| Total license sales | $701,863 00 | $426,614 70 | $1,128,477 70 |
| | | Judges | |
| Kelp tax | $90 22 | | $90 22 |
| Fish tag sales | 3,023 10 | | 3,023 10 |
| Fish packers' tax | 84,446 17 | | 84,446 17 |
| Interest | 5,437 94 | | 5,437 94 |
| Game tag sales | 145 98 | | 145 98 |
| Importers' contributions | 45 00 | | 45 00 |
| Miscellaneous sales | 728 10 | | 728 10 |
| Court fines | 54,498 19 | | 54,498 19 |
| Lease kelp beds | 1,256 40 | | 1,256 40 |
| Total other income | $149,671 10 | | $149,671 10 |
| Total income | $851,534 10 | $426,614 70 | $1,278,148 80 |

## STATEMENT OF EXPENDITURES

**For the Period July 1, 1930, to June 30, 1931, of the Eighty-second Fiscal Year**

| Function | Salaries and wages | Materials and supplies | Service and expense | Property and equipment | Total |
|---|---|---|---|---|---|
| Administration: | | | | | |
| Executive | $6,000 00 | | | $6 46 | $6,006 46 |
| Clerical and office | 21,581 22 | $974 22 | $607 51 | 561 57 | 23,724 52 |
| Printing | | 18,849 57 | | | 18,849 57 |
| Automobiles | | 331 74 | 190 96 | 1,503 90 | 2,026 60 |
| Traveling | | | 2,873 90 | | 2,873 90 |
| Postage | | | 5,046 06 | | 5,046 06 |
| Telephone and telegraph | | | 4,197 48 | | 4,197 48 |
| Freight, cartage and express | | | 2,057 00 | | 2,057 00 |
| Rent | | | 14,572 22 | | 14,572 22 |
| Heat, light and power | | | 27 44 | | 27 44 |
| Accident and death claims | | | 7,272 89 | | 7,272 89 |
| Accounting pro rata | 4,500 00 | | | | 4,500 00 |
| Legal | 6,600 00 | | 333 15 | 177 55 | 7,110 70 |
| Publicity | | | 257 41 | | 257 41 |
| Total administration | $38,681 22 | $20,155 53 | $37,436 02 | $2,249 48 | $98,522 25 |
| Education and research: | | | | | |
| Chief and assistant | $9,385 00 | | | $12 92 | $9,397 92 |
| Clerical and office | 1,920 00 | $342 65 | $282 85 | 347 58 | 2,893 08 |
| Traveling | | | 7,482 16 | | 7,482 16 |
| Telephone and telegraph | | | 32 24 | | 32 24 |
| Freight, cartage and express | | | 18 56 | | 18 56 |
| Photographer | 1,200 00 | | 68 00 | 1,182 15 | 2,450 15 |
| Librarian | 1,912 90 | 121 62 | 98 72 | 267 69 | 2,400 93 |
| Research | 8,638 71 | 487 67 | 2 00 | 9 75 | 9,138 13 |
| Publicity | | | 413 31 | | 413 31 |
| Exhibits | | | 75 75 | 50 00 | 125 75 |
| Temporary help | 1,165 00 | | | | 1,165 00 |
| Summer educational work | 546 68 | | | | 546 68 |
| Total education and research | $24,768 29 | $951 94 | $8,473 59 | $1,870 09 | $36,063 91 |
| Patrol and law enforcement: | | | | | |
| Chief and assistants | $10,823 00 | | | $6 46 | $10,829 46 |
| Clerical and office | 3,057 50 | $347 21 | $16 80 | 120 86 | 3,542 37 |
| Automobiles | | 9,298 47 | 4,014 89 | 14,157 68 | 27,471 04 |
| Traveling | | | 130,318 78 | | 130,318 78 |
| Postage | | | 672 11 | | 672 11 |
| Telephone and telegraph | | | 2,105 39 | | 2,103 39 |
| Freight, cartage and express | | | 70 07 | | 70 07 |
| Rent | | | 752 02 | | 752 02 |
| Captains and deputies | 208,137 82 | 1,497 41 | 228 66 | 245 14 | 210,109 03 |
| Launches | 2,040 00 | 1,427 40 | 1,446 64 | 165 90 | 5,079 94 |
| Fish planting | 2,350 36 | 778 20 | 148 80 | 1,085 05 | 4,362 41 |
| Volunteer deputies | 885 00 | 46 19 | | | 931 19 |
| Premiums on bonds | | | 3,910 89 | | 3,910 89 |
| Temporary help | 780 50 | | | | 780 50 |
| Heat, light and power | | | 15 99 | | 15 99 |
| Total patrol and law enforcement | $228,074 18 | $13,394 88 | $143,701 04 | $15,781 09 | $400,951 19 |
| Commercial fisheries: | | | | | |
| Chief and assistants | $12,270 00 | | | | $12,270 00 |
| Clerical and office | 9,471 67 | $239 74 | $108 57 | $820 00 | 9,828 18 |
| Automobiles | | 741 56 | 367 74 | | 1,109 30 |
| Traveling | | | 21,236 27 | | 21,236 27 |
| Postage | | | 6 17 | | 6 17 |
| Telephone and telegraph | | | 484 12 | | 484 12 |
| Freight, cartage and express | | | 259 60 | | 259 60 |
| Rent | | | 927 50 | | 927 50 |
| Heat, light and power | | | 293 18 | | 293 18 |
| Research | 9,613 87 | 63 40 | 17 90 | 133 73 | 9,828 90 |
| Inspectors | 19,406 90 | | | | 19,406 90 |
| Captains and deputies | 13,782 50 | 162 14 | 40 27 | | 15,984 91 |
| Launches | 12,761 54 | 6,225 44 | 3,708 30 | 4,890 99 | 27,586 27 |
| Laboratory | 31,947 05 | 1,150 19 | 1,992 31 | 2,190 87 | 37,280 42 |
| Blue printing | | | 15 29 | | 15 29 |
| Fish tags | | 382 00 | | | 382 00 |
| Salmon tagging | | | 3 50 | | 3 50 |
| Botulism | | | 15,000 00 | | 15,000 00 |
| Hydro-biological survey, Monterey Bay | | | 1,500 00 | | 1,500 00 |
| Statistics | 2,940 00 | 2,538 69 | 1,393 38 | 203 00 | 7,077 07 |
| Publicity | | | 1 05 | | 1 05 |
| Total commercial fisheries | $114,193 53 | $11,503 16 | $47,355 15 | $7,428 79 | $180,480 63 |

## STATEMENT OF EXPENDITURES

**For the Period July 1, 1930, to June 30, 1931, of the Eighty-second Fiscal Year —Continued**

| Function | Salaries and wages | Materials and supplies | Service and expense | Property and equipment | Total |
|---|---|---|---|---|---|
| Fish culture: | | | | | |
| Chief and assistants | $6,691 61 | | $4 00 | | $6,695 61 |
| Clerical and office | 3,972 58 | $91 80 | 18 43 | $63 00 | 4,143 81 |
| Automobiles | | 5,431 38 | 2,577 20 | 8,697 27 | 16,705 85 |
| Traveling | | | 11,655 21 | | 11,655 21 |
| Postage | | | 106 57 | | 106 57 |
| Telephone and telegraph | | | 1,145 27 | | 1,145 27 |
| Freight, cartage and express | | | 1,725 15 | | 1,725 15 |
| Rent | | | 1,695 61 | | 1,695 61 |
| Heat, light and power | | | 886 42 | | 886 42 |
| Hatcheries | 137,016 58 | 71,160 24 | 1,572 00 | 2,064 41 | 211,813 23 |
| Hatcheries—additions and betterments | | | | 53,762 59 | 53,762 59 |
| Special field investigations | 12,326 33 | 160 28 | 32 62 | 20 00 | 12,539 23 |
| Fish cars | 2,396 52 | 467 20 | 2,325 93 | 141 45 | 5,531 10 |
| Blue printing | | | 5 10 | | 5 10 |
| Cooperative research | 10 00 | 11 61 | 32 40 | 741 99 | 796 00 |
| Total fish culture | $162,613 62 | $77,322 51 | $23,781 91 | $65,490 71 | $329,208 75 |
| Hydraulics: | | | | | |
| Chief and assistants | $7,200 00 | | $3 06 | | $7,203 06 |
| Clerical and office | | $75 25 | 182 06 | | 257 31 |
| Automobiles | | 466 09 | 220 28 | $1,077 50 | 1,763 87 |
| Traveling | | | 1,953 10 | | 1,953 10 |
| Telephone and telegraph | | | 8 89 | | 8 89 |
| Blue printing | | | 14 09 | | 14 09 |
| Cooperative research | 3,000 00 | | | | 3,000 00 |
| Postage | | | 2 00 | | 2 00 |
| Publicity | | | 2 52 | | 2 52 |
| Total hydraulics | $10,200 00 | $541 34 | $2,386 00 | $1,077 50 | $14,204 84 |
| Game propagation: | | | | | |
| Superintendents | $7,865 00 | | | | $7,865 00 |
| Automobiles | | $446 34 | $202 64 | | 648 98 |
| Traveling | | | 1,671 61 | | 1,671 61 |
| Postage | | | 19 57 | | 19 57 |
| Telephone and telegraph | | | 220 12 | | 220 12 |
| Freight, cartage and express | | | 59 31 | | 59 31 |
| Heat, light and power | | | 1,220 94 | | 1,220 94 |
| Maintenance | | 10,773 76 | 2,757 91 | $5,983 58 | 19,515 25 |
| Temporary help | 4,815 18 | | | | 4,815 18 |
| Assistants | 4,440 00 | | | | 4,440 00 |
| Purchase of game birds | | 3,963 93 | | | 3,963 93 |
| Total game propagation | $17,120 18 | $15,184 03 | $6,152 10 | $5,983 58 | $44,439 89 |
| Fish rescue: | | | | | |
| Chief and assistants | $4,670 00 | $30 58 | $191 39 | | $4,891 97 |
| Traveling | | | 1,978 51 | | 1,978 51 |
| Rent | | | 238 00 | | 238 00 |
| Temporary help | 353 00 | | | | 353 00 |
| Total fish rescue | $5,023 00 | $30 58 | $2,407 90 | | $7,461 48 |
| Game refuge: | | | | | |
| Chief and assistants | $4,000 00 | | | | $4,000 00 |
| Clerical and office | 2,268 45 | $1 65 | $13 75 | | 2,283 85 |
| Automobiles | | 809 55 | 464 29 | $1,969 34 | 3,243 18 |
| Traveling | | | 1,754 32 | | 1,754 32 |
| Postage | | | 49 | | 49 |
| Freight, cartage and express | | | 50 | | 50 |
| Lion hunters and trappers | 9,132 00 | | | | 9,132 00 |
| Refuge posting | 6,660 82 | 4 80 | | | 6,665 62 |
| Predatory animal control | | | 7,290 00 | | 7,290 00 |
| Refuge maintenance | 2,659 55 | 2,343 08 | 1,399 88 | 6,248 20 | 12,650 71 |
| Telephone and telegraph | | | 2 40 | | 2 40 |
| Publicity | | | 8 20 | | 8 20 |
| Total game refuge | $24,720 82 | $3,159 08 | $10,933 83 | $8,217 54 | $47,031 27 |
| License commissions | | | | | $59,225 00 |
| Purchase lease and improvements of game refuges | | | | | 133,417 00 |
| State fair and other exhibits | | | | | 4,995 55 |
| Prior year expense—81st fiscal year only | | | | | 4,023 32 |
| Prior year expense—80th fiscal year only | | | | | 4,821 87 |
| Expenditures to pay claim of Fred F. Freitas—Chap. 403-29 | | | | | 10 00 |
| Opening channel of Salinas River | | | | | 2,433 47 |
| Protecting the construction on the Russian River Jetty | | | | | 11,959 11 |
| Grand total, proprietary group | | | | | $1,379,249 53 |

## STATEMENT OF EXPENDITURES

**For the Period July 1, 1931, to June 30, 1932, of the Eighty-third Fiscal Year**

| Function | Salaries and wages | Materials and supplies | Service and expense | Property and equipment | Total |
|---|---|---|---|---|---|
| Administration: | | | | | |
| Executive | $9,000 00 | | | | $9,000 00 |
| Clerical and office | 21,961 23 | $2,637 11 | $463 23 | $735 61 | $25,817 18 |
| Printing | | 21,008 75 | | | 21,008 75 |
| Automobiles | | 296 65 | 339 29 | 15 10 | 651 04 |
| Traveling | | | 4,242 46 | | 4,242 46 |
| Postage | | | 5,905 83 | | 5,905 83 |
| Telephone and telegraph | | | 4,483 93 | | 4,483 93 |
| Freight, cartage and express | | | 3,169 17 | | 3,169 17 |
| Rent | | | 15,608 83 | | 15,608 83 |
| Accident and death claims | | | 3,580 16 | | 3,580 16 |
| Accounting pro rata | 4,500 00 | | | | 4,500 00 |
| Legal | 6,600 00 | | 626 52 | 264 51 | 7,491 03 |
| Premiums on bonds | | | 87 50 | | 87 50 |
| Publicity | | | 505 54 | | 505 54 |
| Total administration | $42,061 23 | $23,962 51 | $39,012 46 | $1,015 22 | $106,051 42 |
| Education and research: | | | | | |
| Chief and assistants | $6,487 94 | | | | $6,487 94 |
| Clerical and office | 2,442 05 | $191 55 | $328 73 | $26 70 | 2,989 03 |
| Automobiles | | 3 05 | 4 50 | | 7 55 |
| Traveling | | | 6,557 80 | | 6,557 80 |
| Telephone and telegraph | | | 28 88 | | 28 88 |
| Freight, cartage and express | | | 8 66 | | 8 66 |
| Photographer | 1,440 00 | | 252 54 | 1,510 46 | 3,203 00 |
| Librarian | 2,007 10 | 230 93 | 123 50 | 246 55 | 2,608 08 |
| Research | 10,871 62 | 388 26 | 3 57 | 33 67 | 11,297 12 |
| Blue printing | | | 12 66 | | 12 66 |
| Publicity | | | 528 67 | | 528 67 |
| Exhibits | | | 8 25 | | 8 25 |
| Lecturer | 3,780 00 | | | | 3,780 00 |
| Temporary help | 77 63 | | | | 77 63 |
| Total education and research | $27,106 34 | $813 79 | $7,857 76 | $1,817 38 | $37,595 27 |
| Patrol and law enforcement: | | | | | |
| Chief and assistants | $11,070 00 | | | | $11,070 00 |
| Clerical and office | 3,210 32 | $143 42 | $91 96 | $108 47 | 3,554 17 |
| Automobiles | | 10,093 24 | 4,812 65 | 17,226 11 | 32,132 00 |
| Traveling | | | 126,852 91 | | 126,852 91 |
| Postage | | | 431 96 | | 431 96 |
| Telephone and telegraph | | | 1,984 66 | | 1,984 66 |
| Freight, cartage and express | | | 64 93 | | 64 93 |
| Rent | | | 565 99 | | 565 99 |
| Heat, light and power | | | 25 94 | | 25 94 |
| Captains and deputies | 206,713 15 | 1,860 66 | 466 76 | 414 92 | 209,455 49 |
| Launches | | 2,548 28 | 1,486 33 | 175 69 | 4,210 30 |
| Fish planting | 6,077 72 | 644 23 | 278 63 | 110 00 | 7,110 58 |
| Volunteer deputies | 435 00 | | | | 435 00 |
| Premiums on bonds | | | 2,570 78 | | 2,570 78 |
| Temporary help | 30 00 | | | | 30 00 |
| Cooks | 1,911 29 | | | | 1,911 29 |
| Total patrol and law enforcement | $229,447 48 | $15,289 83 | $139,633 50 | $18,035 19 | $402,406 00 |
| Commercial fisheries: | | | | | |
| Chief and assistants | $16,170 00 | | | $41 00 | $16,211 00 |
| Clerical and office | 10,364 72 | $242 63 | $117 27 | 82 57 | 10,807 19 |
| Automobiles | | 787 11 | 281 42 | 497 00 | 1,565 53 |
| Traveling | | | 21,102 60 | | 21,102 60 |
| Postage | | | 3 52 | | 3 52 |
| Telephone and telegraph | | | 657 07 | | 657 07 |
| Freight, cartage and express | | | 596 87 | | 596 87 |
| Rent | | | 1,164 94 | | 1,164 94 |
| Heat, light and power | | | 425 33 | | 425 33 |
| Research | 8,113 47 | 206 10 | | 93 60 | 8,413 17 |
| Captains and deputies | 16,530 00 | 142 43 | 109 92 | 13 30 | 16,795 65 |
| Launches | 12,515 00 | 5,308 77 | 2,805 62 | 538 25 | 21,167 64 |
| Laboratory | 30,748 58 | 857 33 | 1,470 69 | 798 41 | 33,875 01 |
| Blue printing | | | 5 94 | | 5 94 |
| Fish tags | | 170 00 | | | 170 00 |
| Hydro-biological survey—Monterey Bay | | | 1,500 00 | | 1,500 00 |
| Statistics | | 1,023 53 | 1,953 67 | 48 15 | 3,025 35 |
| Fish cannery research | | | 15,000 00 | | 15,000 00 |
| Fish cannery inspectors—seasonal | 15,040 55 | | | | 15,040 55 |
| Total commercial fisheries | $109,482 32 | $8,737 90 | $47,194 86 | $2,112 28 | $167,527 36 |

## STATEMENT OF EXPENDITURES

**For the Period July 1, 1931, to June 30, 1932, of the Eighty-third Fiscal Year** —Continued

| Function | Salaries and wages | Materials and supplies | Service and expense | Property and equipment | Total |
|---|---|---|---|---|---|
| Fish culture: | | | | | |
| Chief and assistants | $9,700 00 | | | $42 80 | $9,742 80 |
| Clerical and office | 4,119 67 | $192 68 | $35 20 | 93 35 | 4,440 90 |
| Automobiles | | 5,951 01 | 2,684 17 | 3,862 06 | 12,497 24 |
| Traveling | | | 12,147 26 | | 12,147 26 |
| Postage | | | 110 57 | | 110 57 |
| Telephone and telegraph | | | 1,204 00 | | 1,204 00 |
| Freight, cartage and express | | | 1,279 19 | | 1,279 19 |
| Rent | | | 1,549 84 | | 1,549 84 |
| Heat, light and power | | | 1,388 81 | | 1,388 81 |
| Hatcheries | 113,347 16 | 67,947 38 | 1,862 05 | 2,607 31 | 185,763 90 |
| Special field investigations | 9,735 66 | 178 88 | 20 19 | 7 25 | 9,941 98 |
| Fish cars | 3,540 00 | 427 60 | 2,559 74 | 19 61 | 6,546 95 |
| Blue printing | | 9 24 | 40 91 | | 50 15 |
| Cooperative research | 1,856 45 | 85 43 | 909 18 | 310 25 | 3,161 31 |
| Fish hatchery assistant—seasonal | 29,490 46 | | | | 29,490 46 |
| Total fish culture | $171,789 40 | $74,792 22 | $25,791 11 | $6,942 63 | $279,315 36 |
| Hydraulics: | | | | | |
| Chief and assistants | $8,340 00 | | $50 66 | $41 00 | $8,431 66 |
| Clerical and office | | $23 82 | 47 54 | | 71 36 |
| Automobiles | | 449 04 | 271 27 | | 720 31 |
| Traveling | | | 2,261 26 | | 2,261 26 |
| Postage | | | 1 00 | | 1 00 |
| Telephone and telegraph | | | 8 25 | | 8 25 |
| Cooperative research | 3,000 00 | | | | 3,000 00 |
| Total hydraulics | $11,340 00 | $472 86 | $2,639 98 | $41 00 | $14,493 84 |
| Game propagation: | | | | | |
| Superintendents | $3,300 00 | | | | $3,300 00 |
| Clerical and office | 90 00 | | | | 90 00 |
| Automobiles | | $473 60 | $136 05 | $537 72 | 1,147 37 |
| Traveling | | | 2,379 99 | | 2,379 99 |
| Postage | | | 19 60 | | 19 60 |
| Telephone and telegraph | | | 268 98 | | 268 98 |
| Freight, cartage and express | | | 63 68 | | 63 68 |
| Heat, light and power | | | 1,030 02 | | 1,030 02 |
| Maintenance | | 10,560 08 | 1,233 26 | 4,209 56 | 16,002 90 |
| Assistants | 14,297 57 | | | | 14,297 57 |
| Total game propagation | $17,687 57 | $11,033 68 | $5,131 58 | $4,747 28 | $38,600 11 |
| Fish rescue: | | | | | |
| Chief and assistants | $5,034 00 | $14 94 | $198 62 | $68 00 | $5,315 56 |
| Traveling | | | 2,188 47 | | 2,188 47 |
| Rent | | | 210 00 | | 210 00 |
| Total fish rescue | $5,034 00 | $14 94 | $2,597 09 | $68 00 | $7,714 03 |
| Game refuge: | | | | | |
| Chief and assistants | $8,645 00 | | | | $8,645 00 |
| Clerical and office | 1,920 00 | $32 89 | $4 00 | | 1,956 89 |
| Automobiles | | 1,038 18 | 299 29 | | 1,337 47 |
| Traveling | | | 4,654 78 | | 4,654 78 |
| Postage | | | 1 97 | | 1 97 |
| Telephone and telegraph | | | 21 35 | | 21 35 |
| Freight, cartage and express | | | 50 | | 50 |
| Lion hunters and trappers | 7,466 59 | | | | 7,466 59 |
| Refuge posting | | 122 91 | 252 60 | $863 04 | 1,238 55 |
| Predatory animal control | | | 7,970 00 | | 7,970 00 |
| Temporary help | 16,497 29 | | | | 16,497 29 |
| Refuge maintenance | 5,306 00 | 4,441 98 | 4,816 77 | 6,429 60 | 21,493 75 |
| Pump and pump shelter | | | | 3,916 13 | 3,916 13 |
| Total game refuge | $40,334 88 | $5,635 96 | $18,021 26 | $11,208 17 | $75,200 27 |
| Additions and betterments—construction Russian River jetties (Payable from Support—83d F. Y. Chap. 183-31) | | | | | $48 02 |
| Additions and betterments—opening Salinas River channel (Payable from Support—83d F. Y. Chap. 183-31) | | | | | 42 50 |

## STATEMENT OF EXPENDITURES

**For the Period July 1, 1931, to June 30, 1932, of the Eighty-third Fiscal Year**—Continued

| Function | Property and equipment | Total |
|---|---|---|
| Construction, improvements and equipment: | | |
| Telephone and power line from Chester to Lake Almanor Fish Hatchery | $2,400 00 | |
| Improvements at Lake Almanor Hatchery | 1,391 35 | |
| Bass ponds | 4,013 89 | |
| Filter at Big Creek Hatchery | 141 85 | |
| Permanent repairs on Brookdale Hatchery | 761 30 | |
| Construction of dams on Cherry Creek | 1,000 00 | |
| Completion of egg-collecting racks at Chester | 728 66 | |
| Construction of rearing ponds and a temporary house for an attendant, Hat Creek, Inyo County | 1,245 18 | |
| Tank and egg collecting station at Huntington Lake | 2,355 38 | |
| Filter at Kaweah Hatchery | 488 86 | |
| Klamathon Station—Station House and Dry Room Project | 274 73 | |
| Klamathon Station—Warehouse Project | 215 07 | |
| Repairs and improvements at Mount Shasta Hatchery | 1,525 94 | |
| Maintenance and improvements—Navarro River jetty | 459 50 | |
| Opening Salinas River channel | 70 64 | |
| Permanent improvements on Snow Creek Hatchery | 1,233 12 | |
| Total construction, improvements and equipment | | $18,305 47 |
| Expenditures to pay claim of Electro Metals Company | | $18,750 00 |
| Expenditures to pay claim of John H. Hellard, B. J. Humphreys, Kimball Upson Co., and Moore Mercantile Co. | | 215 81 |
| License commissions | | 48,252 82 |
| Protecting construction of Russian River jetties payable from Chapter 60-1931 | | 15,298 80 |
| Purchase of game refuges | | 120,885 05 |
| State Fair and other exhibits | | 4,946 10 |
| Prior year expense—82d fiscal year | | 14,496 10 |
| Grand total proprietary group | | $1,370,144 33 |

NOTE.—$9,376.91 was transferred from Fish and Game Preservation Fund only to the State Employees' Retirement Fund.

## HUNTING LICENSE SALES

Year 1930

| County | Total | Citizen | Citizen (Junior) | Non-resident | Alien | Declarant-alien |
|---|---|---|---|---|---|---|
| Alameda | $22,227 00 | $21,332 00 | $508 00 | | $200 00 | $180 00 |
| Alpine | 301 00 | 130 00 | 4 00 | $170 00 | | |
| Amador | 1,625 00 | 1,516 00 | 69 00 | | | 40 00 |
| Butte | 9,159 00 | 8,596 00 | 493 00 | 10 00 | | 60 00 |
| Calaveras | 1,623 00 | 1,518 00 | 95 00 | | | 10 00 |
| Colusa | 4,176 00 | 3,872 00 | 274 00 | 10 00 | | 20 00 |
| Contra Costa | 6,587 00 | 6,080 00 | 357 00 | | 50 00 | 100 00 |
| Del Norte | 1,544 00 | 1,352 00 | 62 00 | 40 00 | 50 00 | 40 00 |
| El Dorado | 2,720 00 | 2,584 00 | 106 00 | 10 00 | | 20 00 |
| Fresno | 16,435 00 | 15,250 00 | 960 00 | 10 00 | 75 00 | 140 00 |
| Glenn | 3,894 00 | 3,434 00 | 245 00 | 120 00 | 75 00 | 20 00 |
| Humboldt | 10,580 00 | 9,692 00 | 458 00 | 40 00 | 150 00 | 240 00 |
| Imperial | 3,568 00 | 3,454 00 | 69 00 | | 25 00 | 20 00 |
| Inyo | 2,435 00 | 2,290 00 | 110 00 | | 25 00 | 10 00 |
| Kern | 12,578 00 | 12,048 00 | 430 00 | | 50 00 | 50 00 |
| Kings | 2,382 00 | 2,216 00 | 166 00 | | | |
| Lake | 3,561 00 | 3,356 00 | 175 00 | 10 00 | | 20 00 |
| Lassen | 4,351 00 | 3,694 00 | 232 00 | 260 00 | 25 00 | 140 00 |
| Los Angeles | 83,737 00 | 80,942 00 | 2,175 00 | 100 00 | 350 00 | 170 00 |
| Madera | 2,768 00 | 2,576 00 | 142 00 | | | 50 00 |
| Marin | 3,500 00 | 3,236 00 | 264 00 | | | |
| Mariposa | 431 00 | 402 00 | 29 00 | | | |
| Mendocino | 6,825 00 | 6,370 00 | 305 00 | 20 00 | 50 00 | 80 00 |
| Mereed | 6,216 00 | 5,574 00 | 522 00 | | 50 00 | 70 00 |
| Modoc | 8,508 00 | 3,658 00 | 430 00 | 4,410 00 | | 10 00 |
| Mono | 1,067 00 | 942 00 | 25 00 | 90 00 | | 10 00 |
| Monterey | 8,150 00 | 7,348 00 | 347 00 | 10 00 | 175 00 | 270 00 |
| Napa | 4,918 00 | 4,386 00 | 322 00 | 10 00 | | 200 00 |
| Nevada | 2,760 00 | 2,300 00 | 100 00 | 180 00 | 150 00 | 30 00 |
| Orange | 8,451 00 | 7,982 00 | 414 00 | 10 00 | 25 00 | 20 00 |
| Placer | 4,913 00 | 4,442 00 | 311 00 | | 50 00 | 110 00 |
| Plumas | 3,008 00 | 2,736 00 | 97 00 | 100 00 | 25 00 | 50 00 |
| Riverside | 8,229 00 | 7,858 00 | 341 00 | | | 30 00 |
| Sacramento | 15,925 00 | 14,520 00 | 645 00 | 60 00 | 300 00 | 400 00 |
| San Benito | 2,208 00 | 2,030 00 | 88 00 | | | 90 00 |
| San Bernardino | 10,307 00 | 9,976 00 | 311 00 | | | 20 00 |
| San Diego | 14,919 00 | 13,922 00 | 802 00 | 30 00 | 125 00 | 40 00 |
| San Francisco | 30,260 00 | 26,682 00 | 683 00 | 170 00 | 875 00 | 1,850 00 |
| San Joaquin | 10,319 00 | 9,410 00 | 579 00 | 10 00 | 100 00 | 220 00 |
| San Luis Obispo | 6,164 00 | 5,626 00 | 443 00 | 10 00 | 75 00 | 10 00 |
| San Mateo | 4,524 00 | 4,092 00 | 322 00 | 10 00 | 50 00 | 50 00 |
| Santa Barbara | 6,415 00 | 6,016 00 | 324 00 | | 25 00 | 50 00 |
| Santa Clara | 12,462 00 | 11,406 00 | 571 00 | 10 00 | 175 00 | 300 00 |
| Santa Cruz | 5,574 00 | 4,636 00 | 433 00 | | 175 00 | 330 00 |
| Shasta | 4,594 00 | 4,336 00 | 203 00 | 10 00 | 25 00 | 20 00 |
| Sierra | 941 00 | 704 00 | 37 00 | 190 00 | | 10 00 |
| Siskiyou | 11,248 00 | 8,448 00 | 410 00 | 1,920 00 | 100 00 | 370 00 |
| Solano | 5,753 00 | 5,472 00 | 281 00 | | | |
| Sonoma | 11,627 00 | 10,664 00 | 493 00 | 30 00 | 200 00 | 240 00 |
| Stanislaus | 7,565 00 | 6,930 00 | 535 00 | | 50 00 | 50 00 |
| Sutter | 750 00 | 644 00 | 46 00 | 10 00 | | 50 00 |
| Tehama | 3,570 00 | 3,452 00 | 108 00 | 10 00 | | |
| Trinity | 829 00 | 802 00 | 27 00 | | | |
| Tulare | 9,592 00 | 8,898 00 | 639 00 | 10 00 | 25 00 | 20 00 |
| Tuolumne | 2,417 00 | 2,260 00 | 92 00 | | 25 00 | 40 00 |
| Ventura | 8,261 00 | 7,688 00 | 523 00 | 10 00 | | 40 00 |
| Yolo | 4,373 00 | 3,978 00 | 295 00 | 10 00 | 50 00 | 40 00 |
| Yuba | 4,497 00 | 4,102 00 | 310 00 | | 75 00 | 10 00 |
| State of Nevada | 240 00 | | | 240 00 | | |
| State of Oregon | 5,600 00 | | | 5,600 00 | | |
| Total sales | $464,157 00 | $419,860 00 | $19,837 00 | $13,950 00 | $4,050 00 | $6,460 00 |
| Number of licenses | 231,970 | 209,930 | 19,837 | 1,395 | 162 | 646 |

## HUNTING LICENSE SALES

### Year 1931

| County | Total | Citizen | Citizen (Junior) | Non-resident | Alien | Declarant-alien |
|---|---|---|---|---|---|---|
| Alameda | $19,501 00 | $18,636 00 | $645 00 | $10 00 | $100 00 | $110 00 |
| Alpine | 278 00 | 106 00 | 2 00 | 170 00 | | |
| Amador | 1,600 00 | 1,508 00 | 82 00 | | | 10 00 |
| Butte | 8,351 00 | 7,792 00 | 509 00 | 10 00 | | 40 00 |
| Calaveras | 1,537 00 | 1,432 00 | 95 00 | | | 10 00 |
| Colusa | 3,920 00 | 3,600 00 | 265 00 | 10 00 | 25 00 | 20 00 |
| Contra Costa | 5,814 00 | 5,404 00 | 285 00 | 10 00 | 25 00 | 90 00 |
| Del Norte | 1,428 00 | 1,238 00 | 90 00 | 40 00 | 50 00 | 10 00 |
| El Dorado | 2,514 00 | 2,414 00 | 100 00 | | | |
| Fresno | 15,922 00 | 14,796 00 | 921 00 | | 75 00 | 130 00 |
| Glenn | 3,319 00 | 3,040 00 | 224 00 | 30 00 | 25 00 | |
| Humboldt | 10,025 00 | 9,270 00 | 430 00 | 10 00 | 125 00 | 190 00 |
| Imperial | 3,489 00 | 3,324 00 | 120 00 | | 25 00 | 20 00 |
| Inyo | 2,243 00 | 2,120 00 | 98 00 | | 25 00 | |
| Kern | 10,313 00 | 9,800 00 | 443 00 | 10 00 | 50 00 | 10 00 |
| Kings | 2,099 00 | 1,948 00 | 151 00 | | | |
| *Lake | 3,126 00 | 2,972 00 | 144 00 | 10 00 | | |
| Lassen | 3,768 00 | 3,366 00 | 202 00 | 130 00 | | 70 00 |
| Los Angeles | 78,071 00 | 75,866 00 | 1,865 00 | 50 00 | 200 00 | 90 00 |
| Madera | 2,334 00 | 2,192 00 | 112 00 | | | 30 00 |
| Marin | 3,471 00 | 3,232 00 | 239 00 | | | |
| Mariposa | 421 00 | 402 00 | 19 00 | | | |
| Mendocino | 6,986 00 | 6,466 00 | 325 00 | | 125 00 | 70 00 |
| Merced | 4,962 00 | 4,484 00 | 403 00 | | 25 00 | 50 00 |
| Modoc | 7,997 00 | 3,570 00 | 222 00 | 4,160 00 | 25 00 | 20 00 |
| Mono | 1,011 00 | 890 00 | 51 00 | 70 00 | | |
| Monterey | 7,494 00 | 6,738 00 | 306 00 | 10 00 | 200 00 | 240 00 |
| Napa | 4,761 00 | 4,314 00 | 282 00 | 10 00 | 25 00 | 130 00 |
| Nevada | 2,864 00 | 2,524 00 | 100 00 | 120 00 | 100 00 | 20 00 |
| Orange | 7,021 00 | 6,570 00 | 406 00 | | 25 00 | 20 00 |
| Placer | 4,943 00 | 4,588 00 | 305 00 | | | 50 00 |
| Plumas | 3,334 00 | 3,080 00 | 99 00 | 70 00 | 25 00 | 60 00 |
| Riverside | 7,085 00 | 6,802 00 | 273 00 | | | 10 00 |
| Sacramento | 14,464 00 | 13,302 00 | 627 00 | 10 00 | 225 00 | 300 00 |
| San Benito | 2,134 00 | 1,916 00 | 173 00 | | 25 00 | 20 00 |
| *San Bernardino | 7,672 50 | 7,370 50 | 302 00 | | | |
| San Diego | 13,878 00 | 12,970 00 | 798 00 | 30 00 | 50 00 | 30 00 |
| San Francisco | 26,895 00 | 24,486 00 | 614 00 | 70 00 | 575 00 | 1,150 00 |
| San Joaquin | 8,113 00 | 7,534 00 | 439 00 | | 50 00 | 90 00 |
| San Luis Obispo | 5,987 00 | 5,526 00 | 416 00 | | 25 00 | 20 00 |
| San Mateo | 4,501 00 | 4,008 00 | 313 00 | 10 00 | 100 00 | 70 00 |
| Santa Barbara | 5,740 00 | 5,350 00 | 310 00 | | | 80 00 |
| Santa Clara | 12,380 00 | 11,362 00 | 613 00 | | 175 00 | 230 00 |
| Santa Cruz | 5,846 00 | 4,986 00 | 465 00 | 10 00 | 175 00 | 210 00 |
| Shasta | 4,721 00 | 4,552 00 | 104 00 | 10 00 | 25 00 | 30 00 |
| Sierra | 661 00 | 596 00 | 25 00 | | | 40 00 |
| Siskiyou | 10,491 00 | 8,220 00 | 401 00 | 1,570 00 | | 300 00 |
| Solano | 5,144 00 | 5,070 00 | 74 00 | | | |
| Sonoma | 11,310 00 | 10,404 00 | 576 00 | | 150 00 | 180 00 |
| Stanislaus | 6,647 00 | 6,130 00 | 452 00 | | 25 00 | 40 00 |
| Sutter | 1,250 00 | 1,168 00 | 42 00 | 10 00 | | 30 00 |
| Tehama | 3,944 00 | 3,768 00 | 126 00 | 30 00 | | 20 00 |
| Trinity | 867 00 | 826 00 | 31 00 | 10 00 | | |
| Tulare | 9,298 00 | 8,616 00 | 637 00 | 20 00 | 25 00 | |
| Tuolumne | 2,183 00 | 2,042 00 | 76 00 | | 25 00 | 40 00 |
| Ventura | 7,772 00 | 7,180 00 | 557 00 | | 25 00 | 10 00 |
| Yolo | 3,973 00 | 3,632 00 | 266 00 | 20 00 | 25 00 | 30 00 |
| Yuba | 3,545 00 | 3,266 00 | 244 00 | | 25 00 | 10 00 |
| Oregon | 840 00 | | | 840 00 | | |
| Nevada | 1,460 00 | | | 1,460 00 | | |
| Total sales | $423,718 50 | $388,764 50 | $18,494 00 | $9,030 00 | $3,000 00 | $4,430 00 |
| Number of licenses | 214,342 | 194,382 | 18,494 | 903 | 120 | 443 |

* Lake and San Bernardino counties not complete.

## ANGLING LICENSE SALES

### Year 1930

| County | Total | Citizen | Non-resident | Alien |
|---|---|---|---|---|
| Alameda | $39,169 00 | $38,268 00 | $21 00 | $880 00 |
| Alpine | 441 00 | 256 00 | 180 00 | 5 00 |
| Amador | 1,974 00 | 1,974 00 | | |
| Butte | 8,805 00 | 8,604 00 | 51 00 | 150 00 |
| Calaveras | 1,913 00 | 1,908 00 | | 5 00 |
| Colusa | 1,433 00 | 1,420 00 | 3 00 | 10 00 |
| Contra Costa | 9,832 00 | 9,524 00 | 3 00 | 305 00 |
| Del Norte | 3,313 00 | 3,040 00 | 258 00 | 15 00 |
| El Dorado | 3,757 00 | 3,712 00 | | 45 00 |
| Fresno | 16,908 00 | 16,254 00 | 39 00 | 615 00 |
| Glenn | 1,484 00 | 1,474 00 | | 10 00 |
| Humboldt | 12,225 00 | 11,962 00 | 33 00 | 230 00 |
| Imperial | 1,181 00 | 966 00 | 195 00 | 20 00 |
| Inyo | 9,638 00 | 9,366 00 | 117 00 | 155 00 |
| Kern | 7,121 00 | 7,106 00 | | 15 00 |
| Kings | 1,281 00 | 1,236 00 | | 45 00 |
| Lake | 2,535 00 | 2,514 00 | 6 00 | 15 00 |
| Lassen | 3,986 00 | 3,792 00 | 114 00 | 80 00 |
| Los Angeles | 94,628 00 | 92,786 00 | 207 00 | 1,635 00 |
| Madera | 2,502 00 | 2,496 00 | 6 00 | |
| Marin | 5,264 00 | 5,264 00 | | |
| Mariposa | 2,434 00 | 2,296 00 | 93 00 | 45 00 |
| Mendocino | 6,299 00 | 6,154 00 | 15 00 | 130 00 |
| Merced | 3,577 00 | 3,550 00 | 12 00 | 15 00 |
| Modoc | 2,473 00 | 2,382 00 | 81 00 | 10 00 |
| Mono | 5,624 00 | 4,860 00 | 669 00 | 95 00 |
| Monterey | 5,541 00 | 5,260 00 | 6 00 | 275 00 |
| Napa | 4,782 00 | 4,758 00 | 9 00 | 15 00 |
| Nevada | 4,292 00 | 3,826 00 | 171 00 | 295 00 |
| Orange | 7,664 00 | 7,622 00 | 12 00 | 30 00 |
| Placer | 5,245 00 | 5,030 00 | 30 00 | 185 00 |
| Plumas | 6,214 00 | 5,892 00 | 147 00 | 175 00 |
| Riverside | 5,138 00 | 5,052 00 | 6 00 | 80 00 |
| Sacramento | 21,650 00 | 18,422 00 | 143 00 | 3,085 00 |
| San Benito | 673 00 | 648 00 | | 25 00 |
| San Bernardino | 11,178 00 | 11,096 00 | 12 00 | 70 00 |
| San Diego | 16,697 00 | 16,408 00 | 174 00 | 115 00 |
| San Francisco | 53,303 00 | 49,516 00 | 82 00 | 3,705 00 |
| San Joaquin | 14,026 00 | 13,390 00 | 6 00 | 630 00 |
| San Luis Obispo | 2,174 00 | 2,124 00 | | 50 00 |
| San Mateo | 3,891 00 | 3,716 00 | | 175 00 |
| Santa Barbara | 4,191 00 | 4,068 00 | 3 00 | 120 00 |
| Santa Clara | 11,201 00 | 10,800 00 | 6 00 | 395 00 |
| Santa Cruz | 5,973 00 | 5,360 00 | 3 00 | 610 00 |
| Shasta | 5,361 00 | 5,266 00 | 45 00 | 50 00 |
| Sierra | 422 00 | 334 00 | 18 00 | 70 00 |
| Siskiyou | 10,416 00 | 9,504 00 | 342 00 | 570 00 |
| Solano | 7,008 00 | 6,468 00 | | 540 00 |
| Sonoma | 11,967 00 | 11,646 00 | 21 00 | 300 00 |
| Stanislaus | 8,461 00 | 8,330 00 | 6 00 | 125 00 |
| Sutter | 564 00 | 516 00 | 3 00 | 45 00 |
| Tehama | 3,075 00 | 3,056 00 | 9 00 | 10 00 |
| Trinity | 670 00 | 670 00 | | |
| Tulare | 8,102 00 | 7,970 00 | 72 00 | 60 00 |
| Tuolumne | 3,496 00 | 3,440 00 | 6 00 | 50 00 |
| Ventura | 7,112 00 | 6,924 00 | 33 00 | 155 00 |
| Yolo | 2,224 00 | 2,146 00 | 3 00 | 75 00 |
| Yuba | 3,346 00 | 3,170 00 | 6 00 | 170 00 |
| State of Nevada | 2,988 00 | | 2,988 00 | |
| State of Oregon | 33 00 | | 33 00 | |
| Total sales | $508,875 00 | $485,592 00 | $6,498 00 | $16,785 00 |
| Number of licenses | 248,319 | 242,796 | 2,166 | 3,357 |

## ANGLING LICENSE SALES

### Year 1931

| County | Total | Citizen | Non-resident | Alien |
|---|---|---|---|---|
| Alameda | $43,309 00 | $42,314 00 | $15 00 | $980 00 |
| Alpine | 530 00 | 304 00 | 216 00 | 10 00 |
| Amador | 2,015 00 | 1,970 00 | | 45 00 |
| Butte | 8,383 00 | 8,264 00 | 24 00 | 95 00 |
| Calaveras | 1,497 00 | 1,492 00 | | 5 00 |
| Colusa | 1,423 00 | 1,418 00 | | 5 00 |
| Contra Costa | 12,318 00 | 11,794 00 | 9 00 | 515 00 |
| Del Norte | 3,580 00 | 3,364 00 | 186 00 | 30 00 |
| El Dorado | 3,455 00 | 3,422 00 | 3 00 | 30 00 |
| Fresno | 15,182 00 | 14,770 00 | 12 00 | 400 00 |
| Glenn | 1,391 00 | 1,380 00 | 6 00 | 5 00 |
| Humboldt | 11,830 00 | 11,568 00 | 27 00 | 235 00 |
| Imperial | 1,615 00 | 1,580 00 | | 35 00 |
| Inyo | 9,228 00 | 9,006 00 | 102 00 | 120 00 |
| Kern | 6,211 00 | 6,184 00 | 12 00 | 15 00 |
| Kings | 1,120 00 | 1,080 00 | | 40 00 |
| *Lake | 1,097 00 | 1,086 00 | 6 00 | 5 00 |
| Lassen | 3,544 00 | 3,358 00 | 111 00 | 75 00 |
| Los Angeles | 94,676 00 | 93,396 00 | 150 00 | 1,130 00 |
| Madera | 1,831 00 | 1,828 00 | 3 00 | |
| Marin | 5,124 00 | 5,124 00 | | |
| Mariposa | 2,287 00 | 2,170 00 | 72 00 | 45 00 |
| Mendocino | 6,069 00 | 6,000 00 | 9 00 | 60 00 |
| Merced | 2,918 00 | 2,898 00 | | 20 00 |
| Modoc | 2,153 00 | 1,988 00 | 150 00 | 15 00 |
| Mono | 6,519 00 | 5,908 00 | 576 00 | 35 00 |
| Monterey | 4,188 00 | 3,954 00 | 9 00 | 225 00 |
| Napa | 4,524 00 | 4,428 00 | 21 00 | 75 00 |
| Nevada | 4,293 00 | 3,944 00 | 189 00 | 160 00 |
| Orange | 5,653 00 | 5,622 00 | 6 00 | 25 00 |
| Placer | 5,524 00 | 5,332 00 | 12 00 | 180 00 |
| Plumas | 6,465 00 | 6,098 00 | 162 00 | 205 00 |
| Riverside | 5,360 00 | 5,302 00 | 3 00 | 55 00 |
| Sacramento | 21,210 00 | 17,826 00 | 54 00 | 3,330 00 |
| San Benito | 640 00 | 600 00 | | 40 00 |
| San Bernardino | 12,404 00 | 12,334 00 | 15 00 | 55 00 |
| San Diego | 13,655 00 | 13,520 00 | 60 00 | 75 00 |
| San Francisco | 52,535 00 | 49,100 00 | 90 00 | 3,345 00 |
| San Joaquin | 14,705 00 | 13,848 00 | 12 00 | 845 00 |
| San Luis Obispo | 1,796 00 | 1,746 00 | | 50 00 |
| San Mateo | 4,048 00 | 3,850 00 | 3 00 | 195 00 |
| Santa Barbara | 2,203 00 | 2,138 00 | | 65 00 |
| Santa Clara | 10,778 00 | 10,462 00 | 6 00 | 310 00 |
| Santa Cruz | 5,745 00 | 5,182 00 | 3 00 | 560 00 |
| Shasta | 4,885 00 | 4,790 00 | 15 00 | 80 00 |
| Sierra | 1,083 00 | 1,048 00 | 15 00 | 20 00 |
| Siskiyou | 9,653 00 | 8,794 00 | 354 00 | 505 00 |
| Solano | 7,632 00 | 6,892 00 | | 740 00 |
| Sonoma | 11,066 00 | 10,766 00 | 15 00 | 285 00 |
| Stanislaus | 7,380 00 | 7,304 00 | 6 00 | 70 00 |
| Sutter | 1,012 00 | 974 00 | 3 00 | 35 00 |
| Tehama | 2,896 00 | 2,896 00 | | |
| Trinity | 727 00 | 724 00 | 3 00 | |
| Tulare | 8,392 00 | 8,234 00 | 48 00 | 110 00 |
| Tuolumne | 3,322 00 | 3,274 00 | 3 00 | 45 00 |
| Ventura | 4,957 00 | 4,852 00 | 15 00 | 90 00 |
| Yolo | 2,251 00 | 2,172 00 | 9 00 | 70 00 |
| Yuba | 2,803 00 | 2,660 00 | 3 00 | 140 00 |
| State of Nevada | 3,300 00 | | 3,300 00 | |
| Total sales | $496,390 00 | $474,332 00 | $6,123 00 | $15,935 00 |
| Number of licenses | 242,394 | 237,166 | 2,041 | 3,187 |

* Lake County not complete.

## DEER TAG LICENSE SALES, BY COUNTIES

Years, 1927-1928-1929-1930-1931

| County | 1927 | 1928 | 1929 | 1930 | 1931 |
|---|---|---|---|---|---|
| Alameda | $5,101 00 | $4,947 00 | $5,263 00 | $5,483 00 | $5,686 00 |
| Alpine | 32 00 | 34 00 | 52 00 | 76 00 | 72 00 |
| Amador | 452 00 | 446 00 | 433 00 | 551 00 | 605 00 |
| Butte | 2,902 00 | 2,643 00 | 2,770 00 | 3,026 00 | 3,207 00 |
| Calaveras | 591 00 | 585 00 | 606 00 | 659 00 | 648 00 |
| Colusa | 1,184 00 | 1,149 00 | 1,263 00 | 1,285 00 | 1,406 00 |
| Contra Costa | 1,253 00 | 1,248 00 | 1,395 00 | 1,530 00 | 1,573 00 |
| Del Norte | 414 00 | 445 00 | 426 00 | 464 00 | 462 00 |
| El Dorado | 1,180 00 | 1,098 00 | 1,195 00 | 1,299 00 | 1,209 00 |
| Fresno | 3,324 00 | 3,153 00 | 3,616 00 | 3,789 00 | 4,173 00 |
| Glenn | 1,117 00 | 1,160 00 | 1,178 00 | 1,289 00 | 1,221 00 |
| Humboldt | 3,792 00 | 3,809 00 | 3,756 00 | 4,004 00 | 4,030 00 |
| Imperial | 129 00 | 128 00 | 179 00 | 265 00 | 267 00 |
| Inyo | 852 00 | 865 00 | 796 00 | 890 00 | 929 00 |
| Kern | 3,128 00 | 3,248 00 | 3,584 00 | 3,607 00 | 3,333 00 |
| Kings | 334 00 | 409 00 | 434 00 | 468 00 | 490 00 |
| Lake | 1,652 00 | 1,611 00 | 1,681 00 | 1,741 00 | 1,595 00 |
| Lassen | 1,443 00 | 1,384 00 | 1,618 00 | 1,749 00 | 1,810 00 |
| Los Angeles | 13,879 00 | 11,606 00 | 15,087 00 | 16,026 00 | 17,081 00 |
| Madera | 711 00 | 658 00 | 674 00 | 847 00 | 808 00 |
| Marin | 1,088 00 | 1,157 00 | 1,183 00 | 1,230 00 | 1,211 00 |
| Mariposa | 216 00 | 206 00 | 160 00 | 200 00 | 189 00 |
| Mendocino | 3,032 00 | 2,908 00 | 3,073 00 | 3,242 00 | 3,366 00 |
| Merced | 893 00 | 769 00 | 917 00 | 1,026 00 | 1,123 00 |
| Modoc | 1,137 00 | 1,326 00 | 1,659 00 | 1,894 00 | 1,766 00 |
| Mono | 124 00 | 153 00 | 227 00 | 295 00 | 320 00 |
| Monterey | 2,412 00 | 2,482 00 | 2,674 00 | 2,846 00 | 2,747 00 |
| Napa | 1,769 00 | 1,845 00 | 1,952 00 | 2,105 00 | 2,108 00 |
| Nevada | 848 00 | 691 00 | 687 00 | 1,153 00 | 1,196 00 |
| Orange | 1,224 00 | 1,116 00 | 1,522 00 | 1,678 00 | 1,673 00 |
| Placer | 1,675 00 | 1,864 00 | 1,930 00 | 1,771 00 | 1,935 00 |
| Plumas | 1,307 00 | 1,247 00 | 1,401 00 | 1,371 00 | 1,444 00 |
| Riverside | 1,458 00 | 921 00 | 1,372 00 | 1,910 00 | 1,938 00 |
| Sacramento | 3,367 00 | 3,344 00 | 3,032 00 | 3,541 00 | 4,077 00 |
| San Benito | 828 00 | 781 00 | 846 00 | 842 00 | 924 00 |
| San Bernardino | 1,483 00 | 1,237 00 | 1,756 00 | 1,908 00 | 2,247 00 |
| San Diego | 2,078 00 | 1,948 00 | 2,006 00 | 2,205 00 | 2,291 00 |
| San Francisco | 5,963 00 | 5,803 00 | 5,971 00 | 6,347 00 | 6,868 00 |
| San Joaquin | 2,009 00 | 2,099 00 | 1,952 00 | 2,198 00 | 2,251 00 |
| San Luis Obispo | 1,887 00 | 1,793 00 | 2,044 00 | 2,271 00 | 2,337 00 |
| San Mateo | 979 00 | 1,078 00 | 1,179 00 | 1,157 00 | 1,223 00 |
| Santa Barbara | 2,353 00 | 1,861 00 | 2,005 00 | 2,149 00 | 2,077 00 |
| Santa Clara | 3,722 00 | 3,608 00 | 3,733 00 | 3,871 00 | 4,415 00 |
| Santa Cruz | 1,351 00 | 1,354 00 | 1,442 00 | 1,722 00 | 2,035 00 |
| Shasta | 1,990 00 | 1,894 00 | 1,962 00 | 1,979 00 | 2,125 00 |
| Sierra | 269 00 | 214 00 | 229 00 | 250 00 | 322 00 |
| Siskiyou | 4,234 00 | 3,969 00 | 3,731 00 | 4,183 00 | 4,110 00 |
| Solano | 1,374 00 | 1,448 00 | 1,605 00 | 1,678 00 | 1,640 00 |
| Sonoma | 4,612 00 | 4,402 00 | 4,261 00 | 4,445 00 | 4,610 00 |
| Stanislaus | 1,431 00 | 1,549 00 | 1,574 00 | 1,836 00 | 1,712 00 |
| Sutter | 346 00 | 355 00 | 344 00 | 350 00 | 389 00 |
| Tehama | 1,490 00 | 1,399 00 | 1,429 00 | 1,679 00 | 1,642 00 |
| Trinity | 482 00 | 418 00 | 429 00 | 407 00 | 432 00 |
| Tulare | 2,475 00 | 2,282 00 | 2,677 00 | 2,683 00 | 2,806 00 |
| Tuolumne | 976 00 | 915 00 | 948 00 | 951 00 | 936 00 |
| Ventura | 1,741 00 | 2,245 00 | 2,470 00 | 2,714 00 | 2,795 00 |
| Yolo | 1,433 00 | 1,165 00 | 1,412 00 | 1,536 00 | 1,495 00 |
| Yuba | 1,079 00 | 956 00 | 1,125 00 | 1,318 00 | 1,199 00 |
| State of Nevada | 33 00 | 60 00 | 80 00 | 10 00 | 149 00 |
| State of Oregon | 122 00 | 150 00 | 467 00 | | 277 00 |
| Total sales | $110,760 00 | $105,638 00 | $115,472 00 | $123,999 00 | $129,005 00 |

### MARKET FISHERMEN'S LICENSE SALES

| | |
|---|---|
| Total sales, license year April 1, 1930, to March 31, 1931 | $61,790 00 |
| Total sales, license year April 1, 1931, to March 31, 1932 | 56,510 00 |

License fee: All persons, $10.

### TRAPPING LICENSE SALES

| | |
|---|---|
| Total sales, license year July 1, 1930, to June 30, 1931 | $2,860 00 |
| Total sales, license year July 1, 1931, to June 30, 1932 | 2,858 00 |

License fee: Citizens, $1; aliens, $2.

### FISH PACKERS' AND WHOLESALE SHELL-FISH DEALERS' LICENSE SALES

| | |
|---|---|
| Total sales, license year July 1, 1930, to June 30, 1931 | $1,125 00 |
| Total sales, license year July 1, 1931, to June 30, 1932 | 1,285 00 |

License fee: Citizens, $5; aliens, $20.

### GAME BREEDERS' LICENSE SALES

| | |
|---|---|
| Total sales, license year January 1, 1930, to December 31, 1930 | $970 00 |
| Total sales, license year January 1, 1931, to December 31, 1931 | 1,012 50 |

License fee: All persons, $2.50.

### FISH BREEDERS' LICENSE SALES

| | |
|---|---|
| Total sales, license year January 1, 1930, to December 31, 1930 | $450 00 |
| Total sales, license year January 1, 1931, to December 31, 1931 | 520 00 |

License fee: All persons, $5.

### DOMESTICATED FISH IMPORTERS' LICENSE SALES

| | |
|---|---|
| Total sales, license year January 1, 1930, to December 31, 1930 | $105 00 |
| Total sales, license year January 1, 1931, to December 31, 1931 | 90 00 |

License fee: All persons, $5.

### KELP LICENSE SALES

| | |
|---|---|
| Total sales, year 1930 | $50 00 |
| Total sales, year 1931 | 40 00 |

License for term of one year from date of issuance. Fee, $10.

### COMMERCIAL HUNTING GUN CLUB LICENSE SALES

| | |
|---|---|
| Total sales, year July 1, 1930, to June 30, 1931 | $2,110 00 |
| Total sales, year July 1, 1931, to June 30, 1932 | 1,375 00 |

License fee: Citizens, $25; aliens, $100.

### COMMERCIAL HUNTING CLUB OPERATORS' LICENSE SALES

| | |
|---|---|
| Total sales, year July 1, 1930, to June 30, 1931 | $620 00 |
| Total sales, year July 1, 1931, to June 30, 1932 | 345 00 |

License fee: Citizens, $5; aliens, $25.

## SUMMARY OF FISH DISTRIBUTION, 1930 AND 1931

| Hatchery | Rainbow | Loch Leven | Steelhead | Eastern Brook | German Brown | Black Spotted | Large Lake | Cutthroat | Golden | Silver Salmon | Chinook Salmon | Atlantic Salmon | Grayling | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Alpine | 305,000 | | 150,000 | 115,000 | | 144,000 | | | 12,000 | | | | | |
| Basin Creek | 146,000 | 229,000 | | 110,000 | 68,000 | | | | | | | | | |
| Bear Lake | 941,880 | | | | | | | | | | | | | |
| Big Creek | | | 450,000 | | | | | | | | | | | |
| Blackwood Tanks | 366,000 | | | | | | 285,000 | | | | | | | |
| Brookdale | | | 589,000 | | | | | | | 135,500 | | | | |
| Burney Creek | 1,799,500 | 388,000 | 194,800 | 442,000 | 93,000 | | | | | | | | | |
| Clear Creek | 533,700 | 538,305 | | 177,560 | | | | | | | | | | |
| Cold Creek | | 371,000 | 1,226,500 | | 562,000 | | | | | | | | | |
| Domingo Springs | 1,315,450 | | | | | | | | | | | | | |
| Fall Creek | 1,367,000 | | 415,000 | | | | | | | 476,000 | 2,030,000 | | | |
| Feather River | 864,539 | 489,000 | 420,000 | 539,000 | | | | | | | | | | |
| Fern Creek | | | 1,172,000 | | | 972,000 | | | | | | | | |
| Fort Seward | 395,410 | | 1,876,360 | | | 198,000 | | | | 2,754,380 | | | | |
| Kaweah | 778,860 | 314,875 | 429,000 | 522,850 | 90,590 | | | | | | | | | |
| Kings River | 784,000 | 463,200 | 348,000 | 201,500 | 180,500 | | | | | | | | | |
| Lake Almanor | 1,352,550 | 525,590 | | 139,600 | | | | | | | | | | |
| Madera Tanks | 372,836 | 123,700 | | | | | | | | | | | | |
| Mormon Creek | 320,440 | 193,400 | | 209,482 | | | | | | | | | | |
| Mount Shasta | 6,715,000 | 6,301,000 | 1,459,000 | 3,391,000 | 3,184,000 | | | 101,000 | | | 11,000 | 32,000 | | |
| Mount Tallac | 884,910 | | 470,000 | | | | 765,000 | | | | | | | |
| Mount Whitney | 1,719,000 | 730,000 | 1,220,000 | 1,839,000 | | 540,000 | | 30,000 | 1,470,000 | | | | | |
| Prairie Creek | | | 946,420 | | | | | 53,230 | | 753,930 | 128,840 | | | |
| Rincon Ponds | 336,420 | 44,089 | | | 43,259 | | | | | | | | | |
| Santa Ana | 1,045,074 | | | | 38,000 | | | | | | | | | |
| Snow Creek | 419,420 | 41,078 | | | | | | | | | | | | |
| Tahoe | 549,000 | 240,000 | 522,000 | 1,155,000 | 168,000 | | | | 80,000 | | | | 30,000 | |
| Yosemite | 764,938 | 432,210 | 488,500 | 712,380 | | | | | 95,025 | | | | 52,350 | |
| Yuba River | 495,280 | 319,500 | 232,423 | 273,500 | | | | | | | | | | |
| Totals | 24,572,207 | 11,743,947 | 12,609,003 | 9,827,872 | 4,427,349 | 1,854,000 | 1,050,000 | 184,230 | 1,657,025 | 4,119,810 | 2,169,840 | 32,000 | 82,350 | |

## FISH DISTRIBUTION BY COUNTIES, SEASON 1930—Continued

| Hatchery | Rainbow | Loch Leven | Steelhead | Eastern Brook | German Brown | Black Spotted | Large Lake | Cutthroat | Golden | Silver Salmon | Chinook Salmon | Atlantic Salmon | Grayling | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bear Lake Hatchery— | | | | | | | | | | | | | | |
| Los Angeles County | 20,000 | | | | | | | | | | | | | 20,000 |
| Riverside County | 15,000 | | | | | | | | | | | | | 15,000 |
| San Bernardino County | 596,880 | | | | | | | | | | | | | 596,880 |
| Totals | 631,880 | | | | | | | | | | | | | 631,880 |
| Big Creek Hathery— | | | | | | | | | | | | | | |
| San Mateo County | | | 190,000 | | | | | | | | | | | 190,000 |
| Santa Cruz County | | | 260 000 | | | | | | | 43,325 | | | | 303,325 |
| Totals | | | 450,000 | | | | | | | 43,325 | | | | 493,325 |
| Blackwood Tanks— | | | | | | | | | | | | | | |
| El Dorado County | 180,000 | | | | | | | | | | | | | 180,000 |
| Placer County | 106,000 | | | | | | | | | | | | | 106,000 |
| Totals | 286,000 | | | | | | | | | | | | | 286,000 |
| Brookdale Hatchery— | | | | | | | | | | | | | | |
| San Francisco County | | | | | | | | | | 750 | | | | 750 |
| Santa Clara County | | | 173,000 | | | | | | | | | | | 173,000 |
| Santa Cruz County | | | 246,000 | | | | | | | 134,750 | | | | 380,750 |
| Totals | | | 419,000 | | | | | | | 135,500 | | | | 554,500 |
| Burney Creek Hatchery— | | | | | | | | | | | | | | |
| Lassen County | 10,000 | | | 10,000 | | | | | | | | | | 20,000 |
| Modoc County | 300,000 | 55,000 | 90,000 | 109,000 | | | | | | | | | | 554,000 |
| Shasta County | 510,500 | 126,000 | 104,800 | 159,000 | | | | | | | | | | 900,300 |
| Siskiyou County | 15,000 | | | 5,000 | | | | | | | | | | 20,000 |
| Trinity County | 15,000 | | | 15,000 | | | | | | | | | | 30,000 |
| Totals | 850,500 | 181,000 | 194,800 | 298,000 | | | | | | | | | | 1,524,300 |
| Clear Creek Hatchery— | | | | | | | | | | | | | | |
| Lassen County | 323,700 | 303,305 | | 80,000 | | | | | | | | | | 707,005 |
| Modoc County | 10,000 | | | | | | | | | | | | | 10,000 |
| Plumas County | 180,000 | 215,000 | | 72,560 | | | | | | | | | | 467,560 |
| Shasta County | 20,000 | 20,000 | | 25,000 | | | | | | | | | | 65,000 |
| Totals | 533,700 | 538,305 | | 177,560 | | | | | | | | | | 1,249,565 |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cold Creek Hatchery— | | | | | | | | | | | | | | |
| Humboldt County | | | | | | | | | | | | 1,200 | | 1,200 |
| Lake County | | | 90,000 | | 10,000 | | | | | | | | | 100,000 |
| Marin County | | | 115,000 | | 105,000 | | | | | | | | | 220,000 |
| Mendocino County | | 163,000 | 521,500 | | 162,000 | | | | | | | | | 846,500 |
| Napa County | | 20,000 | 48,000 | | | | | | | | | | | 68,000 |
| Sonoma County | | | 16,000 | | | | | | | | | | | 16,000 |
| Totals | | 183,000 | 790,500 | | 277,000 | | | | | | | 1,200 | | 1,251,700 |
| Domingo Springs Hatchery— | | | | | | | | | | | | | | |
| Lassen County | 290,000 | | | | | | | | | | | | | 290,000 |
| Plumas County | 355,000 | | | | | | | | | | | | | 355,000 |
| Shasta County | 207,000 | | | | | | | | | | | | | 207,000 |
| Tehama County | 70,000 | | | | | | | | | | | | | 70,000 |
| Totals | 922,000 | | | | | | | | | | | | | 922,000 |
| Fall Creek Hatchery— | | | | | | | | | | | | | | |
| Siskiyou County | 663,000 | | 415,000 | | | | | | | | 2,939,000 | | | 4,017,000 |
| Feather River Hatchery— | | | | | | | | | | | | | | |
| Nevada County | 40,000 | | 60,000 | | | | | | | | | | | 100,000 |
| Plumas County | 198,000 | 139,000 | 115,000 | 163,000 | | | | | | | | | | 615,000 |
| Sierra County | 83,539 | 69,000 | 100,000 | 100,000 | | | | | | | | | | 352,539 |
| Totals | 321,539 | 208,000 | 275,000 | 263,000 | | | | | | | | | | 1,067,539 |
| Fern Creek Hatchery— | | | | | | | | | | | | | | |
| Alpine County | | | 22,000 | | | 36,000 | | | | | | | | 58,000 |
| Madera County | | | 60,000 | | | | | | | | | | | 60,000 |
| Mono County | | | 560,000 | | | 376,000 | | | | | | | | 936,000 |
| Totals | | | 642,000 | | | 412,000 | | | | | | | | 1,054,000 |
| Fort Seward Hatchery— | | | | | | | | | | | | | | |
| Humboldt County | 135,000 | | 1,216,000 | | | | | | | 1,442,610 | | | | 2,793,610 |
| Mendocino County | 5,000 | | 8,440 | | | | | | | | | | | 13,440 |
| Trinity County | 56,940 | | 68,060 | | | | | | | | | | | 125,000 |
| Totals | 196,940 | | 1,292,500 | | | | | | | 1,442,610 | | | | 2,932,050 |
| Kaweah Hatchery— | | | | | | | | | | | | | | |
| Kern County | 124,000 | 40,000 | 100,000 | 72,000 | | | | | | | | | | 336,000 |
| Tulare County | 212,560 | 90,400 | 109,025 | 150,775 | | | | | | | | | | 562,760 |
| Ventura County | | | 20,000 | | | | | | | | | | | 20,000 |
| Totals | 336,560 | 130,400 | 229,025 | 222,775 | | | | | | | | | | 918,760 |
| Kings River Hatchery— | | | | | | | | | | | | | | |
| Fresno County | 122,000 | 191,300 | 165,400 | 59,500 | | | | | | | | | | 538,200 |

FISH DISTRIBUTION BY COUNTIES, SEASON 1930—Continued

| Hatchery | Rainbow | Loch Leven | Steelhead | Eastern Brook | German Brown | Black Spotted | Large Lake | Cutthroat | Golden | Silver Salmon | Chinook Salmon | Atlantic Salmon | Grayling | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Madera Tanks— | | | | | | | | | | | | | | |
| Madera County | 150,436 | | | | | | | | | | | | | 150,436 |
| Mormon Creek Hatchery— | | | | | | | | | | | | | | |
| Calaveras County | 61,600 | 131,400 | | 94,182 | | | | | | | | | | 287,182 |
| Tuolumne County | 258,840 | 62,000 | | 115,300 | | | | | | | | | | 436,140 |
| Totals | 320,440 | 193,400 | | 209,482 | | | | | | | | | | 723,322 |
| Mount Shasta Hatchery— | | | | | | | | | | | | | | |
| Alameda County | | | | | | 10,000 | | | | | | | | 10,000 |
| Amador County | 145,000 | 183,000 | | 105,000 | | 145,000 | | | | | | | | 578,000 |
| Butte County | 408,000 | 139,000 | 10,000 | 159,000 | | 65,000 | | | | | | | | 781,000 |
| Calaveras County | | 100,000 | | | | 100,000 | | | | | | | | 200,000 |
| Colusa County | 60,000 | | | 25,000 | | | | | | | | | | 85,000 |
| Del Norte County | 85,000 | | | 58,000 | | | | | | | | | | 143,000 |
| El Dorado County | 275,000 | 310,000 | 20,000 | 70,000 | | 320,000 | | | | | | | | 995,000 |
| Fresno County | 20,000 | 100,000 | 25,000 | 75,000 | | | | | | | | | | 220,000 |
| Glenn County | 30,000 | 12,500 | | 5,000 | | | | | | | | | | 47,500 |
| Inyo County | | 300,000 | | | | 100,000 | | | | | | | | 400,000 |
| Lake County | 15,000 | | | 15,000 | | | | | | | | | | 30,000 |
| Madera County | 100,000 | 81,000 | | 222,000 | | | | | | | | | | 403,000 |
| Mariposa County | 55,000 | 94,000 | | 67,000 | | | | | | | | | | 216,000 |
| Monterey County | 179,000 | 95,000 | 216,000 | | | | | | | | | | | 490,000 |
| Nevada County | 270,000 | 518,000 | 165,000 | 105,000 | | 180,000 | | | | | | | | 1,238,000 |
| Placer County | 370,000 | 469,500 | 20,000 | 55,000 | | 195,000 | | | | | | | | 1,109,500 |
| Plumas County | 168,000 | 85,000 | 65,000 | 119,000 | | 80,000 | | | | | | | | 517,000 |
| Santa Clara County | 4,000 | 46,000 | | | | | | | | | | | | 50,000 |
| Santa Cruz County | | | | | | 2,000 | | | | | | | | 2,000 |
| San Diego County | 40,000 | | | | | 290,000 | | | | | | | | 330,000 |
| Siskiyou County | 800,000 | 340,000 | 472,000 | 350,000 | 50,000 | | | | | | | | | 2,012,000 |
| Shasta County | 99,000 | 5,000 | | 10,000 | 20,000 | | | | | | | | | 134,000 |
| Sierra County | 90,000 | 65,000 | | 30,000 | | | | | | | | | | 185,000 |
| Tehama County | 178,000 | 115,000 | 35,000 | 15,000 | | | | | | | | | | 343,000 |
| Trinity County | 73,000 | | 10,000 | 66,000 | 15,000 | | | | | | | | | 164,000 |
| Tuolumne County | 78,000 | | | | 30,000 | | | | | | | | | 108,000 |
| Yuba County | 32,000 | 20,000 | | | | | | | | | | | | 52,000 |
| Totals | 3,574,000 | 3,078,000 | 1,038,000 | 1,551,000 | 1,602,000 | | | | | | | | | 10,843,000 |
| Mt. Tallac Hatchery— | | | | | | | | | | | | | | |
| El Dorado County | 270,000 | | 215,000 | | | | 305,000 | | | | | | | 790,000 |
| Nevada County | 175,000 | | | | | | | | | | | | | 175,000 |
| Placer County | 80,000 | | 20,000 | | | | 50,000 | | | | | | | 150,000 |
| Totals | 525,000 | | 235,000 | | | | 355,000 | | | | | | | 1,115,000 |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mt. Whitney Hatchery— | | | | | | | | | | | | | | |
| Alpine County | 70,000 | 14,000 | 126,000 | 179,000 | | 14,000 | | | 15,000 | | | | | 418,000 |
| Fresno County | 42,000 | 20,000 | 56,000 | 26,000 | | | | | 190,000 | | | | | 334,000 |
| Inyo County | 209,000 | 96,000 | 323,000 | 347,000 | | 138,000 | | | 400,000 | | | | | 1,513,000 |
| Madera County | 26,000 | | 30,000 | | | | | | 30,000 | | | | | 86,000 |
| Mono County | 167,000 | 120,000 | 190,000 | 457,000 | | 118,000 | | | 295,000 | | | | | 1,347,000 |
| San Luis Obispo County | | | 10,000 | | | | | | | | | | | 10,000 |
| Santa Barbara County | 15,000 | 70,000 | 70,000 | | | | | | | | | | | 155,000 |
| Tulare County | | | | | | | | | 20,000 | | | | | 20,000 |
| Ventura County | 25,000 | 10,000 | 115,000 | | | | | | | | | | | 150,000 |
| Totals | 554,000 | 330,000 | 920,000 | 1,009,000 | | 270,000 | | | 950,000 | | | | | 4,033,000 |
| Prairie Creek Hatchery— | | | | | | | | | | | | | | |
| Humboldt County | | | 614,680 | | | | | | | 365,600 | 25,000 | | | 1,005,280 |
| Rincon Ponds Hatchery— | | | | | | | | | | | | | | |
| Los Angeles County | 160,000 | | | | | | | | | | | | | 160,000 |
| Santa Ana Hatchery— | | | | | | | | | | | | | | |
| Los Angeles County | 70,000 | | | | | | | | | | | | | 70,000 |
| San Bernardino County | 513,490 | | | | | | | | | | | | | 513,490 |
| Total | 583,490 | | | | | | | | | | | | | 583,490 |
| Snow Creek Hatchery— | | | | | | | | | | | | | | |
| Riverside County | 144,539 | | | | | | | | | | | | | 144,539 |
| San Bernardino County | 115,000 | | | | | | | | | | | | | 115,000 |
| Totals | 259,539 | | | | | | | | | | | | | 259,539 |
| Tahoe Hatchery— | | | | | | | | | | | | | | |
| Alpine County | | | | 50,000 | | | | | | | | | | 50,000 |
| El Dorado County | 176,000 | 65,000 | 232,000 | 452,000 | | | | | 40,000 | | | | 30,000 | 995,000 |
| Placer County | 205,000 | | 140,000 | 84,000 | | | | | | | | | | 429,000 |
| Totals | 381,000 | 65,000 | 372,000 | 586,000 | | | | | 40,000 | | | | 30,000 | 1,474,000 |
| Yosemite Hatchery— | | | | | | | | | | | | | | |
| Madera County | | | | | | | | | | | | | 45,000 | 45,000 |
| Mariposa County | 345,000 | 134,600 | 52,000 | 240,200 | | | | | 22,000 | | | | 5,000 | 798,800 |
| Tuolumne County | 43,000 | | 192,000 | 102,000 | | | | | 73,000 | | | | | 410,000 |
| Totals | 388,000 | 134,600 | 244,000 | 342,200 | | | | | 95,000 | | | | 50,000 | 1,253,800 |
| Yuba River Hatchery— | | | | | | | | | | | | | | |
| Nevada County | 216,000 | 140,000 | | 30,000 | | | | | | | | | | 386,000 |
| Sierra County | 74,280 | 1,500 | 104,423 | 68,500 | | | | | | | | | | 248,703 |
| Yuba County | 59,000 | | | | | | | | | | | | | 59,000 |
| Totals | 349,280 | 141,500 | 104,423 | 98,500 | | | | | | | | | | 693,703 |

## FISH DISTRIBUTION BY COUNTIES, SEASON 1931

| Hatchery | Rainbow | Loch Leven | Steelhead | Eastern Brook | German Brown | Black Spotted | Large Lake | Cutthroat | Golden | Silver Salmon | Chinook Salmon | Atlantic Salmon | Grayling | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Alpine Hatchery— | | | | | | | | | | | | | | |
| Alpine County | 261,000 | | 114,000 | 100,000 | | 104,000 | | | 12,000 | | | | | 591,000 |
| Mono County | 44,000 | | 36,000 | 15,000 | | 40,000 | | | | | | | | 135,000 |
| Totals | 305,000 | | 150,000 | 115,000 | | 144,000 | | | 12,000 | | | | | 726,000 |
| Basin Creek Hatchery— | | | | | | | | | | | | | | |
| Calaveras County | 95,000 | 105,000 | | 20,000 | 10,000 | | | | | | | | | 230,000 |
| Tuolumne County | 51,000 | 124,000 | | 90,000 | 58,000 | | | | | | | | | 323,000 |
| Totals | 146,000 | 229,000 | | 110,000 | 68,000 | | | | | | | | | 553,000 |
| Bear Lake Hatchery— | | | | | | | | | | | | | | |
| San Bernardino County | 310,000 | | | | | | | | | | | | | 310,000 |
| Blackwood Tanks— | | | | | | | | | | | | | | |
| Placer County | 80,000 | | | | | | 285,000 | | | | | | | 365,000 |
| Brookdale Hatchery— | | | | | | | | | | | | | | |
| San Mateo County | | | 45,000 | | | | | | | | | | | 45,000 |
| Santa Clara County | | | 40,000 | | | | | | | | | | | 40,000 |
| Santa Cruz County | | | 85,000 | | | | | | | | | | | 85,000 |
| Totals | | | 170,000 | | | | | | | | | | | 170,000 |
| Burney Creek Hatchery— | | | | | | | | | | | | | | |
| Del Norte County | | | | | | | | | | | | 23,000 | | 23,000 |
| Lassen County | 45,000 | | | | | | | | | | | | | 45,000 |
| Modoc County | 225,000 | 65,000 | | 80,000 | | | | | | | | | | 370,000 |
| Shasta County | 664,000 | 142,000 | | 59,000 | 93,000 | | | | | | | | | 958,000 |
| Siskiyou County | 15,000 | | | 5,000 | | | | | | | | | | 20,000 |
| Totals | 949,000 | 207,000 | | 144,000 | 93,000 | | | | | | | 23,000 | | 1,416,000 |
| Cold Creek Hatchery— | | | | | | | | | | | | | | |
| Lake County | | 25,000 | 45,000 | | 70,000 | | | | | | | | | 140,000 |
| Marin County | | | 60,000 | | 110,000 | | | | | | | | | 170,000 |
| Mendocino County | | 123,000 | 289,000 | | 105,000 | | | | | | | | | 517,000 |
| Napa County | | 40,000 | 30,000 | | | | | | | | | | | 70,000 |
| Sonoma County | | | 12,000 | | | | | | | | | | | 12,000 |
| Totals | | 188,000 | 436,000 | | 285,000 | | | | | | | | | 909,000 |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Domingo Springs Hatchery— | | | | | | | | | | | | | | |
| Lassen County | 205,000 | | | | | | | | | | | | | 205,000 |
| Plumas County | 130,000 | | | | | | | | | | | | | 130,000 |
| Shasta County | 58,450 | | | | | | | | | | | | | 58,450 |
| Totals | 393,450 | | | | | | | | | | | | | 393,450 |
| Fall Creek Hatchery— | | | | | | | | | | | | | | |
| Siskiyou County | 704,000 | | | | | | | | | 476,000 | 2,030,000 | | | 3,210,000 |
| Feather River Hatchery— | | | | | | | | | | | | | | |
| Plumas County | 394,000 | 226,000 | 95,000 | 127,000 | | | | | | | | | | 842,000 |
| Sierra County | 149,000 | 55,000 | 50,000 | 149,000 | | | | | | | | | | 403,000 |
| Totals | 543,000 | 281,000 | 145,000 | 276,000 | | | | | | | | | | 1,245,000 |
| Fern Creek Hatchery— | | | | | | | | | | | | | | |
| Inyo County | | | 10,000 | | | 10,000 | | | | | | | | 20,000 |
| Madera County | | | 40,000 | | | 20,000 | | | | | | | | 60,000 |
| Mono County | | | 480,000 | | | 530,000 | | | | | | | | 1,010,000 |
| Totals | | | 530,000 | | | 560,000 | | | | | | | | 1,090,000 |
| Fort Seward Hatchery— | | | | | | | | | | | | | | |
| Humboldt County | 198,470 | | 583,860 | | | 198,000 | | | | 1,311,770 | | | | 2,292,100 |
| Kaweah Hatchery— | | | | | | | | | | | | | | |
| Fresno County | | | 5,000 | | | | | | | | | | | 5,000 |
| Kern County | 78,000 | 65,000 | 100,000 | 74,000 | 50,000 | | | | | | | | | 376,000 |
| Tulare County | 349,300 | 119,475 | 49,000 | 185,850 | 40,590 | | | | | | | | | 744,215 |
| Ventura County | 15,000 | | | | | | | | | | | | | 15,000 |
| Totals | 442,300 | 184,475 | 154,000 | 259,850 | 90,590 | | | | | | | | | 1,131,215 |
| Kings River Hatchery— | | | | | | | | | | | | | | |
| Fresno County | 662,000 | 271,900 | 182,600 | 142,000 | 180,500 | | | | | | | | | 1,439,000 |
| Lake Almanor Hatchery— | | | | | | | | | | | | | | |
| Lassen County | 290,000 | 285,590 | | 59,600 | | | | | | | | | | 635,190 |
| Plumas County | 780,000 | 220,000 | | 53,000 | | | | | | | | | | 1,053,000 |
| Shasta County | 242,550 | 20,000 | | 15,000 | | | | | | | | | | 277,550 |
| Tehama County | 40,000 | | | 12,000 | | | | | | | | | | 52,000 |
| Totals | 1,352,550 | 525,590 | | 139,600 | | | | | | | | | | 2,017,740 |
| Madera Tank Station— | | | | | | | | | | | | | | |
| Madera County | 222,400 | 123,700 | | | | | | | | | | | | 346,100 |
| Mt. Shasta Hatchery— | | | | | | | | | | | | | | |
| Amador County | 66,000 | 188,000 | | 28,000 | 100,000 | | | | | | | | | 382,000 |
| Butte County | 328,000 | 130,000 | | 84,000 | 10,000 | | | | | | | | | 552,000 |
| Calaveras County | | | | | 190,000 | | | | | | | | | 190,000 |
| Colusa County | 50,000 | 5,000 | | 10,000 | 10,000 | | | | | | | | | 75,000 |

FISH DISTRIBUTION BY COUNTIES, SEASON 1931—Continued

| Hatchery | Rainbow | Loch Leven | Steelhead | Eastern Brook | German Brown | Black Spotted | Large Lake | Cutthroat | Golden | Silver Salmon | Chinook Salmon | Atlantic Salmon | Grayling | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mt. Shasta Hatchery—Contd. | | | | | | | | | | | | | | |
| Del Norte County | | | | | | | | | | | | 17,000 | | 17,000 |
| El Dorado County | 432,000 | 331,000 | | 51,000 | 153,000 | | | 15,000 | | | | | | 982,000 |
| Fresno County | | 200,000 | | | | | | | | | | | | 200,000 |
| Glenn County | 10,000 | 50,000 | | | | | | | | | | | | 60,000 |
| Inyo County | | 200,000 | | | 100,000 | | | | | | | | | 300,000 |
| Lake County | 15,000 | | | 15,000 | | | | | | | | | | 30,000 |
| Los Angeles County | | | | | 12,000 | | | | | | | | | 12,000 |
| Madera County | | | | | 25,000 | | | | | | | | | 25,000 |
| Mariposa County | 47,000 | 34,000 | 10,000 | 12,000 | | | | | | | | | | 103,000 |
| Mono County | | 100,000 | | | | | | | | | | | | 100,000 |
| Monterey County | 60,000 | 70,000 | 120,000 | | 20,000 | | | | | | | | | 270,000 |
| Nevada County | 245,000 | 590,000 | 93,000 | 67,000 | 75,000 | | | | | | | | | 1,070,000 |
| Placer County | 288,000 | 270,000 | | 1,170,000 | 124,000 | | | | | | | | | 1,852,000 |
| Plumas County | 186,000 | 118,000 | 10,000 | 34,000 | 40,000 | | | | | | | | | 388,000 |
| San Diego County | 3,000 | 13,000 | | | 354,000 | | | | | | | | | 370,000 |
| San Joaquin County | | | | | 75,000 | | | | | | | | | 75,000 |
| San Mateo County | | | 5,000 | | | | | | | | | | | 5,000 |
| Santa Cruz County | | | | | 4,000 | | | | | | | | | 4,000 |
| Shasta County | 73,000 | 130,000 | | 6,000 | 50,000 | | | | | | | | | 259,000 |
| Sierra County | 30,000 | 35,000 | | 20,000 | | | | | | | | | | 85,000 |
| Siskiyou County | 845,000 | 399,000 | 118,000 | 327,000 | 145,000 | | | 86,000 | | | 11,000 | 15,000 | | 1,946,000 |
| Tehama County | 159,000 | 140,000 | | | 10,000 | | | | | | | | | 309,000 |
| Trinity County | 126,000 | | 65,000 | 16,000 | | | | | | | | | | 207,000 |
| Tuolumne County | 152,000 | 200,000 | | | | | | | | | | | | 352,000 |
| Yuba County | 26,000 | 20,000 | | | 85,000 | | | | | | | | | 131,000 |
| Totals | 3,141,000 | 3,223,000 | 421,000 | 1,840,000 | 1,582,000 | | | 101,000 | | | 11,000 | 32,000 | | 10,351,000 |
| Mt. Tallac Hatchery— | | | | | | | | | | | | | | |
| El Dorado County | 150,000 | | 210,000 | | | | 360,000 | | | | | | | 720,000 |
| Nevada County | 180,000 | | | | | | | | | | | | | 180,000 |
| Placer County | 29,910 | | 25,000 | | | | 50,000 | | | | | | | 104,910 |
| Totals | 359,910 | | 235,000 | | | | 410,000 | | | | | | | 1,004,910 |
| Mt. Whitney Hatchery— | | | | | | | | | | | | | | |
| Alpine County | | | | 30,000 | | | | | 12,000 | | | | | 42,000 |
| Fresno County | 110,000 | | 84,000 | 26,000 | | | | | 113,000 | | | | | 333,000 |
| Inyo County | 597,000 | 165,000 | 68,000 | 249,000 | | 156,000 | | 30,000 | 177,000 | | | | | 1,442,000 |
| Madera County | 41,000 | | | | | | | | 20,000 | | | | | 61,000 |
| Mono County | 335,000 | 225,000 | | 525,000 | | 114,000 | | | 177,000 | | | | | 1,376,000 |
| Tulare County | 57,000 | | | | | | | | 21,000 | | | | | 78,000 |
| Ventura County | 25,000 | 10,000 | 148,000 | | | | | | | | | | | 183,000 |
| Totals | 1,165,000 | 400,000 | 300,000 | 830,000 | | 270,000 | | 30,000 | 520,000 | | | | | 3,515,000 |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Prairie Creek Hatchery— | | | | | | | | | | | | | | | |
| Del Norte County | | | 130,000 | | | | | | | | | | | | 130,000 |
| Humboldt County | | | 201,740 | | | | | 53,230 | | 388,330 | 103,840 | | | | 747,140 |
| Totals | | | 331,740 | | | | | 53,230 | | 388,330 | 103,840 | | | | 877,140 |
| Rincon Ponds Hatchery— | | | | | | | | | | | | | | | |
| Los Angeles County | 148,620 | | | | 32,348 | | | | | | | | | | 180,968 |
| Riverside County | 6,000 | | | | | | | | | | | | | | 6,000 |
| San Bernardino County | 21,800 | 44,089 | | | 10,911 | | | | | | | | | | 76,800 |
| Totals | 176,420 | 44,089 | | | 43,259 | | | | | | | | | | 263,768 |
| Santa Ana Hatchery— | | | | | | | | | | | | | | | |
| Riverside County | 8,000 | | | | | | | | | | | | | | 8,000 |
| San Bernardino County | 453,584 | | | | 38,000 | | | | | | | | | | 491,584 |
| Totals | 461,584 | | | | 38,000 | | | | | | | | | | 499,584 |
| Snow Creek Hatchery— | | | | | | | | | | | | | | | |
| Los Angeles County | 1,000 | | | | | | | | | | | | | | 1,000 |
| Riverside County | 137,181 | 10,000 | | | | | | | | | | | | | 147,181 |
| San Bernardino County | 21,700 | 31,078 | | | | | | | | | | | | | 52,778 |
| Totals | 159,881 | 41,078 | | | | | | | | | | | | | 200,959 |
| Tahoe Hatchery— | | | | | | | | | | | | | | | |
| Alpine County | | | | 40,000 | | | | | | | | | | | 40,000 |
| El Dorado County | 118,000 | 77,000 | 120,000 | 414,000 | 108,000 | | | | 40,000 | | | | | | 877,000 |
| Nevada County | | 50,000 | | | | | | | | | | | | | 50,000 |
| Placer County | 50,000 | 48,000 | 30,000 | 115,000 | 60,000 | | | | | | | | | | 303,000 |
| Totals | 168,000 | 175,000 | 150,000 | 569,000 | 168,000 | | | | 40,000 | | | | | | 1,270,000 |
| Yosemite Hatchery— | | | | | | | | | | | | | | | |
| Madera County | 20,000 | | | 20,000 | | | | | | | | | | | 40,000 |
| Mariposa County | 162,938 | 177,610 | 184,000 | 46,380 | | | | | | | | | | 2,300 | 573,228 |
| San Francisco County | | | | | | | | | 25 | | | | | 50 | 75 |
| Tuolumne County | 194,000 | 120,000 | 60,500 | 303,800 | | | | | | | | | | | 678,300 |
| Totals | 376,938 | 297,610 | 244,500 | 370,180 | | | | | 25 | | | | | 2,350 | 1,291,603 |
| Yuba River Hatchery— | | | | | | | | | | | | | | | |
| Nevada County | 42,000 | 120,000 | 90,000 | 120,000 | | | | | | | | | | | 372,000 |
| Sierra County | 104,000 | 58,000 | 38,000 | 45,000 | | | | | | | | | | | 245,000 |
| Yuba County | | | | 10,000 | | | | | | | | | | | 10,000 |
| Totals | 146,000 | 178,000 | 128,000 | 175,000 | | | | | | | | | | | 627,000 |

# ARRESTS AND CONVICTIONS

## RECAPITULATION

| | Number of arrests | Fines imposed | Jail sentences (days) |
|---|---|---|---|
| Fish cases, 1930-1931 | 1,624 | $39,709 50 | 2,354 |
| Game cases, 1930-1931 | 1,112 | 36,975 00 | 2,563 |
| Totals, 1930-1931 | 2,736 | $76,684 50 | 4,917 |
| Fish cases, 1931-1932 | 1,251 | $22,010 50 | 3,259 |
| Game cases, 1931-1932 | 1,250 | 30,008 00 | 5,763½ |
| Totals, 1931-1932 | 2,501 | $52,018 50 | 9,022½ |
| Recapitulation— | | | |
| 1930-1931 | 2,736 | $76,684 50 | 4,917 |
| 1931-1932 | 2,501 | 52,018 50 | 9,022½ |
| Totals 1930-1931, 1931-1932 | 5,237 | $128,703 00 | 13,939½ |

## TOTAL ARRESTS FOR A PERIOD OF THIRTY YEARS

| | |
|---|---|
| 1902–1904 | 550 |
| 1904–1906 | 774 |
| 1906–1908 | 1,192 |
| 1908–1910 | 1,771 |
| 1910–1912 | 2,063 |
| 1912–1914 | 1,993 |
| 1914–1916 | 2,087 |
| 1916–1918 | 1,797 |
| 1918–1920 | 1,891 |
| 1920–1922 | 2,258 |
| 1922–1924 | 2,715 |
| 1924–1926 | 3,207 |
| 1926–1928 | 4,390 |
| 1928–1930 | 5,388 |
| 1930–1932 | 5,237 |

## GAME CASES

| | July 1, 1930, to June 30, 1931 | | | July 1, 1931, to June 30, 1932 | | |
|---|---|---|---|---|---|---|
| | Number of arrests. | Fines and forfeitures imposed. | Jail sentence (days) | Number of arrests. | Fines and forfeitures imposed. | Jail sentence (days) |
| Bear—closed season | 3 | $45 00 | | | | |
| Deer—closed season; failure to retain horns and hide; overlimit; selling deer meat; failure to tag; killing does; fawns; spiked buck | 369 | 17,779 00 | 1,323 | 440 | $12,121 00 | 3,937½ |
| Ducks, geese—possession in closed season; overlimit; selling of | 40 | 1,930 00 | 125 | 53 | 1,658 00 | 361 |
| Doves, pigeons—closed season; overlimit | 78 | 1,852 00 | 45 | 63 | 1,500 00 | |
| Grouse—closed season | 2 | 25 00 | | 2 | 75 00 | |
| Hunting License Act, violations of | 212 | 4,297 50 | 165 | 168 | 2,946 00 | 247 |
| Hunting in refuge | 53 | 2,034 00 | 51 | 119 | 2,216 00 | 5 |
| Bird nets—illegal possession | 5 | 125 00 | | 7 | 100 00 | 180 |
| Night hunting | 76 | 1,415 00 | 420 | 60 | 1,395 00 | 300 |
| Non-game birds, killing of | 56 | 1,245 00 | 5 | 90 | 1,587 50 | 51 |
| Pheasants, killing of | 15 | 1,235 00 | 5 | 38 | 1,731 00 | 412 |
| Quail—closed season; overlimit | 52 | 2,045 00 | 214 | 71 | 2,699 00 | 45 |
| Rabbits—closed season | 43 | 618 00 | 85 | 24 | 347 50 | |
| Shorebirds, killing of | 33 | 737 50 | | 28 | 460 00 | 10 |
| Tree squirrels, killing of | 7 | 75 00 | 6 | 15 | 270 00 | |
| Sagehen—killing of in closed season | 3 | 30 00 | 10 | 2 | 50 00 | |
| Swan, killing of | 8 | 200 00 | 5 | 8 | 220 00 | |
| Shooting from auto or boat | 28 | 610 00 | 50 | 12 | 152 50 | |
| Spotlight hunting | | | | 4 | 25 00 | 90 |
| Trespassing | 4 | 60 00 | | 21 | 190 00 | |
| Trapping song birds | 8 | 312 00 | 54 | 1 | | |
| Turkeys—killing of, closed season | 1 | | | 1 | | 125 |
| Trapping License Act, violations of | 5 | 50 00 | | 12 | 160 00 | |
| Woodducks, killing of | 6 | 150 00 | | 5 | 30 00 | |
| Commercial Gun Club License Act, violations of | 5 | 105 00 | | 5 | 25 00 | |
| Shipping wild game by parcel post | | | | 1 | 50 00 | |
| Totals | 1,112 | $36,975 00 | 2,563 | 1,250 | $30,008 00 | 5,763½ |

## FISH CASES

| | July 1, 1930, to June 30, 1931 | | | July 1, 1931, to June 30, 1932 | | |
|---|---|---|---|---|---|---|
| | Number of arrests. | Fines and forfeitures imposed. | Jail sentence (days) | Number of arrests. | Fines and forfeitures imposed. | Jail sentence (days) |
| Angling License Act, violations of | 241 | $4,320 00 | 295 | 237 | $3,649 50 | 238 |
| Abalones—overlimit; undersized; closed season | 249 | 5,868 00 | 508 | 185 | 3,020 00 | 133 |
| Barracuda—small | 16 | 425 00 | 10 | 3 | 35 00 | 2½ |
| Bass: | | | | | | |
| Black—closed season; overlimit | 37 | 645 00 | ------ | 18 | 890 00 | 30 |
| Calico—closed season | 1 | 25 00 | ------ | ------ | ------ | ------ |
| Striped—closed season; undersized | 100 | 2,274 00 | 255 | 76 | 1,904 00 | ------ |
| White sea—closed season | ------ | ------ | ------ | 1 | 25 00 | ------ |
| Clams—closed season; small; overlimit | 342 | 7,947 50 | 692 | 182 | 2,615 00 | 615 |
| Crabs—closed season; females; undersize | 26 | 540 00 | 30 | 44 | 1,210 00 | 205 |
| Catfish—small | 2 | 50 00 | ------ | 5 | 30 00 | ------ |
| Crappie, perch, sunfish—closed season | 34 | 545 00 | ------ | 21 | 343 00 | 40 |
| Cockles—small | ------ | ------ | ------ | 9 | 30 00 | 30 |
| Corbina—illegal sale of | 1 | ------ | ------ | ------ | ------ | ------ |
| Grayfish—closed season | 2 | 15 00 | ------ | ------ | ------ | ------ |
| Commercial Fishing License Act, violations of | 119 | 1,077 00 | ------ | 97 | 665 00 | 47½ |
| Dynamiting fish | 6 | 1,000 00 | ------ | 4 | 400 00 | ------ |
| Illegal fishing apparatus—spears, traps, gaff hooks | 57 | 1,252 00 | 121 | 56 | 605 00 | 166 |
| Fishing too near dam, mouth of stream or fish ladder | 17 | 304 00 | ------ | 14 | 155 00 | 25 |
| Grunion—closed season | 1 | 10 00 | ------ | ------ | ------ | ------ |
| Lobsters—closed season; small; overlimit | 58 | 3,000 00 | 25 | 55 | 1,390 00 | 190 |
| Mussels—closed season | 10 | 250 00 | ------ | 36 | 396 00 | 6 |
| Nets, seines—illegal | 72 | 4,065 00 | 300 | 82 | 2,565 00 | 1,400 |
| Night fishing | 14 | 165 00 | ------ | 11 | 50 00 | 10 |
| Pollution of streams, bay | 19 | 675 00 | ------ | 4 | 265 00 | ------ |
| Salmon—closed season; overlimit | 56 | 1,302 00 | 78 | 13 | 310 00 | 10 |
| Sea lion—killing of | 1 | 100 00 | ------ | ------ | ------ | ------ |
| Trout—closed season; overlimit | 138 | 3,770 00 | 40 | 88 | 1,403 00 | 111 |
| Miscellaneous fish | 5 | 85 00 | ------ | 6 | 45 00 | ------ |
| Taking marine life from Hopkins M. Refuge | ------ | ------ | ------ | 4 | 10 00 | ------ |
| Totals | 1,624 | $39,709 50 | 2,354 | 1,251 | $22,010 50 | 3,259 |

## SEIZURES OF FISH AND GAME

| | July 1, 1930, to June 30, 1931 | July 1, 1931, to June 30, 1932 | Total |
|---|---|---|---|
| Abalone | 762 | 3,340 | 4,102 |
| Abalone (pounds) | 4,429 | 270 | 4,699 |
| Barracuda (pounds) | 7,816 | 4,733 | 12,549 |
| Bass— | | | |
| Black | 323 | 108 | 431 |
| Calico | 2 | | 2 |
| Rock | | 160 | 160 |
| Striped | 502 | 1,263 | 1,765 |
| Striped (pounds) | 95 | 1,638 | 1,733 |
| White sea (pounds) | | 516 | 516 |
| Clams | 7,571 | 6,029 | 13,600 |
| Crabs | 179 | 623 | 802 |
| Crappie, perch, sunfish (pounds) | 940 | 364 | 1,304 |
| Catfish (pounds) | 60 | 181 | 241 |
| Cockles (pounds) | 40 | 812 | 852 |
| Croaker spotfin; corbina (pounds) | 61 | 56 | 117 |
| Grayfish | 31 | | 31 |
| Grunion | 7 | | 7 |
| Halibut | | 24 | 24 |
| Lobsters | 2,028 | 1,009 | 3,037 |
| Lobsters (pounds) | 1,998 | 4,337 | 6,335 |
| Mussels (pounds) | 1,130 | 1,046 | 2,176 |
| Nets, seines | 4 | 2 | 6 |
| Salmon | 43 | 57 | 100 |
| Salmon (pounds) | 3,844 | 14,802 | 18,646 |
| Sardines (pounds) | 15 | | 15 |
| Steelhead (pounds) | 8,841 | 1,222 | 10,063 |
| pears | 57 | 9 | 66 |
| Shad (pounds) | 550 | 170 | 720 |
| Smelt (pounds) | | 75 | 75 |
| Smallfish (pounds) | 150 | 533 | 683 |
| Skipjack (pounds) | | 7,015 | 7,015 |
| Trout | 479 | 298 | 777 |
| Traps, fish | 192 | 94 | 286 |
| Tuna, bluefin | 24,144 | 56,093 | 80,237 |
| Tuna, yellowfin | | 20,576 | 20,576 |
| Whiting (pounds) | 15 | | 15 |
| Deer | 236 | 296 | 532 |
| Deer meat (pounds) | 2,199 | 3,150 | 5,349 |
| Deer hides | 13 | 26 | 39 |
| Doves, pigeons | 1,205 | 318 | 1,523 |
| Ducks, geese, mudhens | 437 | 1,428 | 1,865 |
| Elk meat (pounds) | | 55 | 55 |
| Grouse | 2 | 1 | 3 |
| Non-game birds | 103 | 292 | 395 |
| Pheasants | 12 | 17 | 29 |
| Quail | 565 | 64 | 629 |
| Rabbits | 73 | 50 | 123 |
| Shorebirds | 101 | 79 | 180 |
| Squirrels, tree | 12 | 17 | 29 |
| Sagehen | 11 | 4 | 15 |
| Swans | 10 | 6 | 16 |
| Traps, nets (bird) | 5 | 23 | 28 |
| Woodducks | 20 | 11 | 31 |
| Hides, animal | 4 | 44 | 48 |
| Turkeys | | 5 | 5 |

## DEER KILL WITHIN 50, 75 AND 100 MILES OF SAN FRANCISCO AND LOS ANGELES

### 1931

| | 50 miles | | 75 miles | | 100 miles |
|---|---|---|---|---|---|
| Alameda | 248 | | 248 | | 248 |
| Marin | 449 | | 449 | | 449 |
| Contra Costa | 11 | | 11 | | 11 |
| San Mateo | 103 | | 103 | | 103 |
| Napa ¼ | 122 | | 488 | | 488 |
| Solano ½ | 22 | | 44 | | 44 |
| Santa Cruz ⅓ | 42 | | 127 | | 127 |
| Santa Clara ⅕ | 139 | | 697 | | 697 |
| Sonoma ⅕ | 181 | | 903 | | 903 |
| | | Lake ⅕ | 145 | (⅔) | 484 |
| | 1,317 | Yolo | 191 | | 191 |
| | | San Joaquin | 25 | | 25 |
| | | Stanislaus | 94 | | 94 |
| | | | | Merced | 60 |
| | | | 3,525 | San Benito ⅛ | 92 |
| | | | | Colusa ⅔ | 202 |
| | | | | Mendocino ⅙ | 284 |
| | | | | | 4,502 |
| Los Angeles | 949 | | 949 | | 949 |
| Ventura ¼ | 98 | (⅘) | 312 | | 390 |
| Orange | 114 | | 114 | | 114 |
| Riverside 1/10 | 66 | (⅕) | 133 | | 663 |
| San Bernardino 1/10 | 24 | (½) | 118 | | 237 |
| | | Kern ⅕ | 53 | (⅔) | 176 |
| | 1,251 | | | Santa Barbara ⅓ | 252 |
| | | | 1,679 | San Diego ⅙ | 56 |
| | | | | | 2,837 |

Alameda_
Marin----
Contra C
San Mate
Napa ¼-
Solano ½
Santa Cru
Santa Cla
Sonoma ½

Los Angel
Ventura ½
Orange---
Riverside
San Berna

## RECORD OF MOUNTAIN LION BOUNTIES PAID BY DIVISION OF FISH AND GAME

| County | 1907 | 1908 | 1909 | 1910 | 1911 | 1912 | 1913 | 1914 | 1915 | 1916 | 1917 | 1918 | 1919 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Alameda | | 1 | | | | | | | | | | | |
| Alpine | | | | | | | | | 1 | | | | |
| Amador | | 3 | | 1 | 2 | 2 | | | | 1 | | | |
| Butte | 2 | 11 | 5 | 2 | 4 | 3 | 2 | 1 | | | 1 | | 2 |
| Calaveras | | 1 | 4 | 1 | | 1 | | 1 | 3 | | | | 2 |
| Colusa | | 3 | | 3 | 3 | 1 | 1 | 2 | 1 | | | 3 | |
| Contra Costa | | | | | | | | | | | | | |
| Del Norte | | 10 | 12 | 4 | 11 | 11 | 23 | 4 | 2 | 9 | 4 | 2 | 5 |
| El Dorado | 2 | 7 | 2 | 1 | 8 | 9 | 6 | 1 | | 2 | 1 | 1 | 8 |
| Fresno | | 1 | 3 | 1 | | 4 | | 1 | 1 | 1 | 4 | 3 | 4 |
| Glenn | | 13 | 6 | 6 | 1 | 4 | 5 | 1 | | | 1 | 3 | 3 |
| Humboldt | 10 | 113 | 67 | 71 | 42 | 50 | 41 | 46 | 26 | 39 | 29 | 22 | 8 |
| Imperial | | | | | | | | | 1 | | | | |
| Inyo | | | | | | 1 | | 1 | 3 | 1 | | | 1 |
| Kern | | 8 | 10 | 12 | 5 | 9 | 10 | 5 | 15 | 18 | 17 | 10 | 15 |
| Kings | | | | | | | | | | | 1 | | |
| Lake | 2 | 14 | 11 | 13 | 9 | 10 | 7 | 5 | 8 | 2 | 5 | 11 | 9 |
| Lassen | | | 1 | | 2 | 1 | 2 | | | | | | 1 |
| Los Angeles | | 7 | 1 | 2 | 2 | | 2 | 5 | 5 | 1 | 7 | 8 | 9 |
| Madera | | 3 | 5 | 1 | | 1 | 1 | 9 | 10 | 1 | 2 | 5 | 1 |
| Marin | | | | | | | | | | | | | |
| Mariposa | 2 | 4 | 3 | 6 | 2 | 1 | 4 | 9 | 2 | 14 | 13 | 12 | 5 |
| Mendocino | 5 | 44 | 18 | 11 | 16 | 17 | 24 | 15 | 7 | 7 | 15 | 18 | 22 |
| Merced | | | | 1 | | | | | | | | | |
| Modoc | | | 1 | 1 | 1 | | | | | | | 1 | |
| Mono | | | | | | | | 2 | | 5 | | | |
| Monterey | | 14 | 11 | 7 | 1 | 3 | 9 | 3 | 8 | 6 | 12 | 12 | 19 |
| Napa | | | | 1 | | 2 | | | | | | | |
| Nevada | | 1 | 1 | 1 | | | | | | 2 | | 2 | |
| Orange | | | 1 | 1 | 1 | | 1 | | | | 2 | 2 | 1 |
| Placer | | 5 | 4 | 1 | 2 | 7 | 3 | 3 | 1 | 4 | 2 | 2 | 3 |
| Plumas | | 2 | | 3 | | 1 | 2 | | | | 1 | | |
| Riverside | | 2 | 5 | | | 4 | 2 | | | 3 | 4 | 4 | 5 |
| Sacramento | | | | | | | | | | | | | 1 |
| San Benito | | 1 | 2 | 1 | 2 | 11 | 3 | 2 | 2 | 5 | 1 | 2 | 1 |
| San Bernardino | | 5 | 2 | 1 | 2 | | 2 | 1 | 1 | | 1 | 5 | 3 |
| San Diego | | 3 | 5 | 5 | 8 | 3 | 1 | 2 | 1 | 1 | 3 | 4 | 5 |
| San Francisco | | | | | | | | | | | | | |
| San Joaquin | | | | | | | | | 2 | | | | |
| San Luis Obispo | | 11 | 5 | 9 | 4 | 4 | 5 | 7 | 10 | 3 | 9 | 3 | 6 |
| San Mateo | | | | 1 | | | | | | | | | |
| Santa Barbara | | 7 | 24 | 7 | 3 | 5 | 11 | 4 | 4 | 6 | 3 | 6 | 19 |
| Santa Clara | | | 4 | | | 1 | 1 | 1 | 1 | 4 | 2 | 3 | 2 |
| Santa Cruz | | | | 1 | | | | | | | | | 1 |
| Shasta | 1 | 25 | 32 | 31 | 29 | 28 | 22 | 9 | 7 | 10 | 11 | 26 | 30 |
| Sierra | | 1 | | | | 3 | 2 | | | | | | |
| Siskiyou | 1 | 31 | 35 | 45 | 25 | 25 | 22 | 31 | 9 | 9 | 7 | 1 | |
| Solano | | | | | | | | | | | | | |
| Sonoma | | | 2 | 4 | 1 | 4 | 1 | 2 | | 1 | 4 | 2 | 1 |
| Stanislaus | | | 2 | | 1 | | | | 1 | | 3 | 1 | 1 |
| Sutter | | | | | | 1 | | | | | | | 1 |
| Tehama | 3 | 31 | 19 | 25 | 10 | 22 | 27 | 5 | 4 | 1 | 3 | 6 | 3 |
| Trinity | 9 | 86 | 34 | 32 | 22 | 15 | 14 | 13 | 4 | 3 | 2 | 12 | 14 |
| Tulare | | 6 | 8 | 11 | 4 | 5 | 3 | 10 | 8 | 8 | 4 | 11 | 17 |
| Tuolumne | | 6 | 10 | 5 | 2 | 4 | 1 | 2 | 7 | 11 | 6 | 9 | 12 |
| Ventura | | 1 | 6 | 4 | 6 | 2 | | 1 | 7 | 1 | 8 | 2 | 2 |
| Yolo | | | | | | | | | | | | | |
| Yuba | | 1 | | | 2 | | | | | | | | 1 |
| Totals | 37 | 482 | 361 | 333 | 233 | 275 | 260 | 204 | 162 | 179 | 188 | 214 | 243 |

| 1920 | 1921 | 1922 | 1923 | 1924 | 1925 | 1926 | 1927 | 1928 | 1929 | 1930 | 1931 | Totals | County |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1 | | | | | | | | | 2 | Alameda |
| | | | | 1 | 1 | | | | | | | 3 | Alpine |
| | | 2 | | | 1 | 1 | 1 | 1 | 3 | 4 | | 22 | Amador |
| | | 1 | | | 1 | 1 | 1 | 1 | 2 | | 1 | 41 | Butte |
| | 3 | | 1 | 2 | 1 | 2 | 4 | 9 | 3 | | | 38 | Calaveras |
| | 1 | 2 | 1 | 2 | 2 | 5 | 2 | 2 | 4 | 9 | 8 | 55 | Colusa |
| | | | | | | | | | | | | | Contra Costa |
| 1 | 3 | 4 | 2 | 8 | 6 | 4 | 9 | 5 | 8 | 2 | 4 | 153 | Del Norte |
| 6 | 14 | 7 | 3 | 3 | 4 | 13 | 17 | 5 | 7 | 15 | 8 | 150 | El Dorado |
| 2 | 6 | 2 | 3 | 10 | 2 | 4 | 12 | 7 | | 6 | 12 | 89 | Fresno |
| 3 | 3 | 10 | 1 | 4 | 1 | 2 | 1 | 10 | 2 | 15 | 11 | 106 | Glenn |
| 19 | 16 | 14 | 10 | 11 | 13 | 13 | 15 | 10 | 21 | 22 | 13 | 741 | Humboldt |
| 1 | | | | | | | | | | | | 2 | Imperial |
| | 1 | | 4 | 4 | | | | 1 | | 1 | | 18 | Inyo |
| 12 | 8 | 17 | 22 | 21 | 14 | 20 | 14 | 20 | 3 | 9 | 15 | 309 | Kern |
| | | | | | | | | | | | | 1 | Kings |
| 11 | 10 | 21 | 21 | 12 | 17 | 22 | 9 | 27 | 28 | 19 | 18 | 321 | Lake |
| | 2 | | | | | | | | | | | 9 | Lassen |
| 12 | 7 | 5 | 3 | 4 | 3 | 3 | 3 | 11 | 22 | 13 | | 135 | Los Angeles |
| 1 | | | 1 | 2 | 2 | 1 | 1 | 2 | 1 | 1 | 1 | 52 | Madera |
| | | | | | | | | | | | 1 | 1 | Marin |
| 4 | 6 | 7 | 5 | | | 13 | 3 | 7 | 4 | 2 | 1 | 129 | Mariposa |
| 13 | 15 | 22 | 9 | 15 | 30 | 20 | 14 | 32 | 13 | 16 | 9 | 427 | Mendocino |
| 1 | 1 | | | | 1 | | | | 1 | | | 5 | Merced |
| | | | | 1 | | | | | | | | 5 | Modoc |
| 1 | 2 | 1 | | 1 | 2 | 1 | | 2 | | | | 17 | Mono |
| 12 | 7 | 16 | 17 | 30 | 23 | 26 | 23 | 37 | 34 | 27 | 16 | 373 | Monterey |
| | | | | | | | | | | | | 3 | Napa |
| | | | | 1 | | | | 1 | | | 3 | 12 | Nevada |
| | | | | | | | | | | | | 9 | Orange |
| 9 | 13 | | 5 | | | 6 | 3 | 1 | 6 | | 3 | 83 | Placer |
| | | 1 | | | | | | | | 1 | 2 | 13 | Plumas |
| 6 | 8 | | 2 | 2 | 3 | 3 | | 4 | 2 | 2 | 1 | 62 | Riverside |
| | | | | | | | | | | | | 1 | Sacramento |
| 2 | 2 | 2 | 3 | 2 | 1 | 3 | 1 | 1 | 1 | | 1 | 52 | San Benito |
| 6 | 2 | 4 | 3 | 4 | 10 | 5 | 5 | 7 | 4 | 7 | 1 | 81 | San Bernardino |
| 4 | 2 | | 1 | 5 | 5 | 3 | 10 | 7 | 34 | 5 | 14 | 131 | San Diego |
| | | | | | | | | | | | | | San Francisco |
| | | | | | | | | | | | | 2 | San Joaquin |
| 9 | 12 | 13 | 10 | 8 | 5 | 5 | 8 | 7 | 4 | 10 | 8 | 175 | San Luis Obispo |
| | | | | | | | | | | | | 1 | San Mateo |
| 5 | 15 | 26 | 13 | 11 | 5 | 11 | 14 | 13 | 17 | 20 | 25 | 274 | Santa Barbara |
| 2 | 4 | 1 | 11 | 4 | 3 | 3 | | 3 | 2 | 2 | 1 | 55 | Santa Clara |
| | | | 2 | | | | | | | | | 4 | Santa Cruz |
| 8 | 8 | 37 | 16 | 16 | 17 | 11 | 13 | 15 | 16 | 19 | 15 | 452 | Shasta |
| | | | | | | | | | 1 | 1 | 3 | 11 | Sierra |
| 2 | 9 | 14 | 5 | 6 | 3 | 3 | 16 | 8 | 8 | 2 | 15 | 332 | Siskiyou |
| | | | | | | | | | | | | | Solano |
| 2 | | 1 | | | | | 1 | 1 | | | | 27 | Sonoma |
| | 1 | | | | 3 | | | 3 | 1 | | | 17 | Stanislaus |
| | | | | | | | | | | | | 2 | Sutter |
| 17 | 18 | 14 | 4 | 14 | 2 | 5 | 6 | 9 | 11 | 6 | 16 | 281 | Tehama |
| 13 | 21 | 19 | 11 | 16 | 15 | 11 | 4 | 33 | 28 | 36 | 40 | 507 | Trinity |
| 23 | 17 | 22 | 15 | 45 | 9 | 4 | 12 | 16 | 9 | 10 | 17 | 294 | Tulare |
| 4 | 15 | 13 | 11 | 4 | 1 | 11 | 2 | 7 | 2 | 5 | 1 | 151 | Tuolumne |
| 8 | 4 | 1 | 8 | 15 | 15 | 14 | 17 | 2 | 6 | 4 | 8 | 142 | Ventura |
| | | | | | | | | | | | | | Yolo |
| | | | 1 | 1 | 4 | | | 5 | 1 | 1 | 1 | 18 | Yuba |
| 219 | 256 | 299 | 225 | 285 | 225 | 249 | 241 | 332 | 309 | 292 | 293 | 6,396 | |

## CALIFORNIA FRESH FISHERY PRODUCTS FOR YEAR 1930

Compiled by Division of Fish and Game, Bureau of Commercial Fisheries

| Species of fish | Del Norte, Humboldt | Mendocino, Sonoma, Lake | Marin | Solano, Yolo | Sacramento, San Joaquin | Alameda, Contra Costa | San Francisco, San Mateo | Santa Cruz | Monterey |
|---|---|---|---|---|---|---|---|---|---|
| Albacore | | | | | | | | 346 | 172,616 |
| Anchovies | | | | | | | 261,850 | 400 | 43,100 |
| Barracuda | | | | | | | | 30 | |
| Bonito | | | | | | | | 447 | 719 |
| Carp | | | | 14,395 | 24,882 | 22,743 | 4,992 | | |
| Catfish | | 43,343 | | 4,940 | 270,348 | 114,560 | | | |
| Cultus Cod | 343,049 | 163,459 | 50 | | | | 581,852 | 74,485 | 121,869 |
| Eels | | | 10 | | | | | | |
| Flounders | 5,225 | 27,010 | | 25 | | 526 | 329,267 | 28,894 | 98 |
| Grayfish | 2,345 | | | | | | 221,672 | 8,645 | 280 |
| Hake | | | | | | | 50,983 | 5,105 | |
| Halibut | 393,050 | 20,908 | 41 | | | | 31,078 | 6,481 | 17,931 |
| Hardhead | | 27 | | | 38,857 | | | | |
| Herring | 71,639 | 230 | 202,990 | | | | 398,937 | | |
| Kingfish | | 9 | | | | | 40,337 | 52,266 | 72,341 |
| Mackerel | | | | | | | 12,362 | 14,819 | 1,348,287 |
| Mackerel—Horse | | | | | | | | 30 | 95,241 |
| Mackerel—Spanish | | | | | | | | | |
| Mullet | | | | | | | | | |
| Perch | 32,061 | | 62,127 | | | 23 | 50,336 | 1,224 | 13,733 |
| Pike | | | | 279 | 3,451 | 1,477 | | | |
| Pompano | | | | | | | | 169 | 347 |
| Rock Bass | | | | | | | | | 16 |
| Rockfish | 173,970 | 76,998 | 145 | | | | 1,027,351 | 1,236,167 | 1,589,803 |
| Sablefish | 551,504 | 73,200 | | | | | 461,348 | 233,138 | 34,451 |
| Salmon | 2,387,507 | 1,114,032 | 9 | 185,694 | 335,688 | 692,316 | 1,008,233 | 73,268 | 206,141 |
| Sandabs | 29,764 | 20,150 | | | | | 478,287 | 60,799 | 14,948 |
| Sardines | | | | | | | 48,468,957 | 55,805 | 259,042,128 |
| Sculpin | | 229 | | | | | | 465 | 352 |
| Sea Bass—Black | | | | | | | | | |
| Sea Bass—White | 139 | 77 | 12,004 | | | | 36,330 | 43,957 | 1,720 |
| Shad | 3 | | | 3,194 | 1,698 | 7,166 | 39,750 | | |
| Shad—Buck | | | | 52,513 | 24,791 | 321,258 | 1,103 | | |
| Shad—Roe | | | | 124,610 | 46,507 | 576,447 | 422 | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Sheepshead | | | | | | | | | |
| Skates | 3,030 | | | | | | 221,324 | 16,753 | 12,118 |
| Skipjack | | | | | | | | | |
| Smelt | 65,198 | 4,625 | 31,366 | | | 3,796 | 163,244 | 111,477 | 228,486 |
| Sole | 1,505,159 | 64,240 | | | | | 8,059,671 | 807,847 | 96,272 |
| Splittail | | | | | 8,656 | 9,872 | | | |
| Striped Bass | | | 1,988 | 100,135 | 161,405 | 544,630 | 58,650 | | |
| Suckers | | | | | 1,958 | 32 | | | |
| Swordfish | | | | | | | | | |
| Tomcod | 712 | | | | | 138 | 22,322 | | |
| Tuna—Bluefin | | | | | | | | | |
| Tuna—Yellowfin | | | | | | | | | |
| Turbot | | | 918 | | | | 6,427 | | |
| Whitebait | 100,768 | 39,520 | 925 | | | | 30,708 | 31 | 2,965 |
| Whitefish | | | | | | | | | |
| Yellowtail | | | | | | | | | |
| Miscellaneous | 67,706 | 2,538 | 333 | 245 | 445 | 856 | 10,277 | 8,394 | 4,337 |
| Total fish | 5,732,829 | 1,650,595 | 312,906 | 486,030 | 918,686 | 2,295,840 | 62,078,070 | 2,841,442 | 263,120,299 |
| Crustaceans: | | | | | | | | | |
| Crabs | [1]92,448 | | [2]11,064 | | | | [4]1,887,768 | [5]1,008 | [7]96 |
| Shrimps | | | 1,391,584 | | | | 1,296,247 | | 8,736 |
| Spiny Lobsters | | | | | | | | | |
| Mollusks: | | | | | | | | | |
| Abalones | | | | | | | | | 3,158,975 |
| Clams—Cockle | | 30 | 89,723 | | | | | | |
| Clams—Mixed | 16,386 | | 880 | | | | | | |
| Clams—Pismo | | | | | | | | 72 | 11,972 |
| Clams—Softshell | | | 76,226 | | | 19,498 | 20,847 | | |
| Cuttlefish | | 5,141 | | | | | 8,578 | 1,696 | 61,307 |
| Mussels | | | | | | | 25 | | 300 |
| Oysters—Eastern | | | [3]171,407 | | | | [6]410,960 | | |
| Oysters—Native | | | 16,647 | | | | 24,596 | | |
| Squid | | | | | [8] | | | 10,585 | 10,927,389 |
| Miscellaneous: | | | | | | | | | |
| Terrapins | | | | | 58 | | | | |
| Turtles | | | | | | | | | |
| Totals | 5,841,663 | 1,655,766 | 2,070,437 | 486,030 | 918,744 | 2,315,338 | 65,727,091 | 2,854,803 | 277,289,074 |

All amounts shown in pounds unless otherwise specified. Skipjack and Albacore cleaned.
[1] 3,852 dozen. [2] 461 dozen. [3] 779,125 shell oysters. [4] 78,657 dozen. [5] 1,868,000 shell oysters. [6] 42 dozen. [7] 4 dozen.

CALIFORNIA FRESH FISHERY PRODUCTS FOR YEAR 1930—Continued

Compiled by Division of Fish and Game, Bureau of Commercial Fisheries

| Species of fish | San Luis Obispo, Santa Barbara, Ventura | Los Angeles | Orange | San Diego, Imperial | Total | Fish from south of the International Boundary brought into San Pedro | Fish from south of the International Boundary brought into San Diego | Total fish from south of International Boundary brought into California |
|---|---|---|---|---|---|---|---|---|
| Albacore | | 107,987 | | 2,168 | 283,117 | | | |
| Anchovies | | 10,028 | 283 | 3,900 | 319,561 | | | |
| Barracuda | 2,204 | 2,489,577 | 63,094 | 958,703 | 3,513,608 | 937,715 | 312,443 | 1,250,158 |
| Bonito | 470 | 2,605,671 | 18,501 | 1,240,688 | 3,866,496 | 1,214,567 | 83,197 | 1,297,764 |
| Carp | | 2,375 | | | 69,387 | | | |
| Catfish | | | | | 433,191 | | | |
| Cultus Cod | 2,473 | 872 | 63 | | 1,288,172 | | | |
| Eels | | 10 | | | 20 | | | |
| Flounders | 51 | 4,717 | 172 | 43 | 396,028 | 100 | | 100 |
| Grayfish | 11,018 | 218,335 | 58,814 | 124,633 | 645,742 | 1,555 | | 1,555 |
| Hake | | | | | 56,088 | | | |
| Halibut | 312,247 | 385,073 | 33,746 | 109,465 | 1,310,020 | 12,562 | 189,136 | 201,698 |
| Hardhead | | | | | 38,884 | | | |
| Herring | 259 | | | 43,579 | 717,634 | | | |
| Kingfish | 40 | 288,255 | 1,448 | 2,471 | 457,167 | | | |
| Mackerel | 822 | 12,826,709 | 1,645,821 | 681,280 | 16,530,100 | | 1,264 | 1,264 |
| Mackerel—Horse | | 273,557 | | | 368,828 | | | |
| Mackerel—Spanish | | | | | | 19,620 | 16,834 | 36,454 |
| Mullet | | 3,423 | 7,673 | 9,657 | 20,753 | 554 | 6,511 | 7,065 |
| Perch | 3,251 | 100,587 | 593 | 3,377 | 267,312 | 660 | | 660 |
| Pike | | | | | 5,207 | | | |
| Pompano | | 1,308 | 43 | 356 | 2,223 | | | |
| Rock Bass | 16,976 | 199,657 | 129,003 | 130,020 | 475,672 | 13,972 | 18,519 | 32,491 |
| Rockfish | 46,633 | 1,951,477 | 46,201 | 1,053,604 | 7,202,349 | | 8,405 | 8,405 |
| Sablefish | | 4,540 | 966 | | 1,359,147 | | | |
| Salmon | | 6 | | | 6,002,894 | | | |
| Sandabs | | 12,321 | 80 | | 616,349 | | | |
| Sardines | 7,965,088 | 174,746,267 | 520 | 4,171,982 | 494,450,747 | | | |
| Sculpin | 105 | 59,036 | 6,426 | 23,043 | 89,656 | | | |
| Sea Bass—Black | 1,136 | 74,030 | 28,080 | 84,227 | 187,473 | 71,102 | 135,384 | 206,486 |
| Sea Bass—White | 63,636 | 814,355 | 8,694 | 258,373 | 1,236,285 | 128,243 | 258,944 | 387,187 |
| Shad | | | | | 51,811 | | | |
| Shad—Buck | | | | | 399,665 | | | |
| Shad—Roe | | | | | 747,986 | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Sheepshead | 11,216 | 190,282 | 2,095 | 37,461 | 241,054 | 377 | 2,258 | 2,635 |
| Skates | 2,380 | 24,461 | 4,569 | 1,755 | 286,390 | | | |
| Skipjack | | 1,106,744 | 2,936 | 1,905,595 | 3,015,275 | 5,737,340 | 11,732,972 | 17,470,312 |
| Smelt | 49,003 | 307,923 | 63,267 | 13,927 | 1,042,312 | | 1,082 | 1,082 |
| Sole | 331,875 | 43,336 | 4,155 | 6,498 | 10,919,053 | | | |
| Splittail | | | | | 18,528 | | | |
| Striped Bass | | | | | 866,808 | | | |
| Suckers | | | | | 1,990 | | | |
| Swordfish | | 195,745 | 680 | 365,070 | 561,495 | | 1,234 | 1,234 |
| Tomcod | | | | | 23,172 | | | |
| Tuna—Bluefin | | 15,443,288 | 58 | 155,546 | 15,598,892 | 6,156,000 | 172,390 | 6,322,390 |
| Tuna—Yellowfin | | 12,564 | | 22,989 | 35,553 | 12,537,771 | 44,080,857 | 56,618,628 |
| Turbot | | | | | 7,345 | | | |
| Whitebait | 55 | | | | 174,972 | | | |
| Whitefish | 846 | 112,901 | 1,552 | 99,267 | 214,566 | 360 | 10,176 | 10,536 |
| Yellowtail | 84 | 236,062 | 5,662 | 973,121 | 1,214,959 | 2,414,674 | 1,140,795 | 3,555,469 |
| Miscellaneous | 260 | 126,877 | 3,292 | 471 | 226,031 | [3]392,268 | 121,674 | 513,942 |
| Total fish | 8,822,128 | 214,980,386 | 2,138,487 | 12,483,269 | 577,860,967 | 29,633,440 | 58,294,075 | 87,927,515 |
| Crustaceans: | | | | | | | | |
| Crabs | | 12 | | | [3] 1,992,396 | | | |
| Shrimps | | | | | 2,696,567 | | | |
| Spiny Lobsters | 59,898 | 188,837 | 18,935 | 106,780 | 374,450 | | 1,019,689 | 1,019,689 |
| Mollusks: | | | | | | | | |
| Abalones | 17,538 | | | | 3,176,513 | | | |
| Clams—Cockle | | 33,264 | 2,196 | | 125,213 | | | |
| Clams—Mixed | | | | | 17,266 | | | |
| Clams—Pismo | 96,816 | | | | 108,860 | | | |
| Clams—Softshell | | | | | 116,571 | | | |
| Cuttlefish | | 127 | 131 | | 76,980 | | | |
| Mussels | | | | | 325 | | | |
| Oysters—Eastern | | | | | [3]582,367 | | | |
| Oysters—Native | | | | | 41,243 | | | |
| Squid | | 36,376 | | 1,112 | 10,969,462 | | | |
| Miscellaneous: | | | | | | | | |
| Terrapins | | | | | 58 | | | |
| Turtles | | | | | | | 580 | 580 |
| Totals | 8,996,380 | 215,233,002 | 2,159,749 | 12,591,161 | 598,139,238 | 29,633,440 | 59,314,344 | 88,947,784 |

[3]83,016 dozen. [3] 2,647,125 shell oysters.

## CANNED, CURED AND MANUFACTURED FISHERY PRODUCTS OF CALIFORNIA FOR THE YEAR 1930

(Compiled by the Division of Fish and Game, Bureau of Commercial Fisheries.)

### Canned

| Kind of fish | Size of cans | Northern California district, cases | Monterey district, cases | San Pedro district, cases | San Diego district, cases | Total cases |
|---|---|---|---|---|---|---|
| Abalones | 1-lb. tall | | 82 | | | 82 |
| Albacore | 4-lb. (12 to case) | | | 346 | | 346 |
| | 1-lb. | | | 16,648 | 77 | 16,725 |
| | ½-lb. | | | 119,379 | 1,706 | 121,085 |
| | ½-lb. glass (24 to case) | | | 1,157 | | 1,157 |
| | ¼-lb. | | | 3,192 | | 3,192 |
| | ¼-lb. (96 to case) | | | 1,566 | | 1,566 |
| | ⅛-lb. (96 to case) | | | 1,460 | | 1,460 |
| Bonito | 1-lb. | | | 5,554 | 936 | 6,490 |
| | ½-lb. | | | 40,421 | 5,725 | 46,146 |
| | ¼-lb. | | | 624 | | 624 |
| | ¼-lb. (100 to case) | | | 9,945 | 6,136 | 16,081 |
| Fish cakes | ½-lb. | | | 933 | | 933 |
| Mackerel | 1-lb. tall | | 117 | 122,858 | 4,250 | 127,225 |
| | 1-lb. oval (24 to case) | | | 30 | | 30 |
| | ½-lb. | | | | 78 | 78 |
| Salmon | 1-lb. flat | 860 | | | | 860 |
| | ½-lb. flat | 10,342 | | | | 10,342 |
| Sardines | 1-lb. tall | | 74,043 | 106,460 | 2,359 | 182,862 |
| | 1-lb. oval | | 1,579,408 | 863,254 | 15,500 | 2,458,162 |
| | ¾-lb. round | | | 8,138 | | 8,138 |
| | ½-lb. oval | | 19,692 | 2,909 | 1,590 | 24,191 |
| | ½-lb. square | | 391 | | 451 | 842 |
| | 6-oz. square | | | | 871 | 871 |
| | 5-oz. tall (100 to case) | | 141,524 | 228,965 | | 370,489 |
| | ¼-lb. square (100 to case) | | 3,751 | | 16,429 | 20,180 |
| | ¼-lb. square (48 to case) | | | | 3,789 | 3,789 |
| Shad | 1-lb. tall | 1,796 | | | | 1,796 |
| Shad roe | ½-lb. oval | 2,413 | | | | 2,413 |
| Squid | 1-lb. tall | | 270 | | | 270 |
| | 9-oz. | | 16,721 | | | 16,721 |
| | 7-oz. | | 8,280 | | | 8,280 |
| Tonno | ½-lb. | | | 4,867 | 2,027 | 6,894 |
| | ¼-lb. | | | | 777 | 777 |
| | ¼-lb. (100 to case) | | | 52,243 | 15,071 | 67,314 |
| Tuna, bluefin | 4-lb. (12 to case) | | | 209 | | 209 |
| | 1-lb. | | | 28,766 | 663 | 29,429 |
| | ½-lb. | | | 203,171 | 2,602 | 205,773 |
| | ¼-lb. | | | 48,429 | 3,612 | 52,041 |
| | ¼-lb. (100 to case) | | | 22,085 | 67 | 22,152 |
| Tuna, striped | 1-lb. | | | 5,499 | 16,329 | 21,828 |
| | ½-lb. | | | 58,337 | 140,224 | 198,561 |
| | ¼-lb. | | | 10,672 | 27,909 | 38,581 |
| | ¼-lb. (100 to case) | | | 7,774 | 1,386 | 9,160 |
| Tuna, yellowfin | 4-lb. (12 to case) | | | 25 | | 25 |
| | 1-lb. | | | 18,353 | 89,920 | 108,273 |
| | ½-lb. | | | 122,712 | 509,849 | 632,561 |
| | ¼-lb. | | | 13,695 | 115,460 | 129,155 |
| | ¼-lb. (100 to case) | | | 2,721 | 5,362 | 8,083 |
| | ⅛lb. (96 to case) | | | 285 | | 285 |
| Tuna, flakes | 1-lb. | | | 3,836 | 3,998 | 7,834 |
| | ½-lb. | | | 7,152 | 12,771 | 19,923 |
| | ¼-lb. | | | 520 | 1,284 | 1.804 |
| Tuna, unclassified | 4-lb. (12 to case) | | | 2,485 | | 2,485 |
| | 1-lb. | | | 5,286 | 2,373 | 7,659 |
| | ½-lb. | | | 59,350 | 13,189 | 72,539 |
| | ¼-lb. | | | 6,956 | 3,463 | 10,419 |
| | ¼-lb. (100 to case) | | | 30,410 | | 30,410 |

## CANNED, CURED AND MANUFACTURED FISHERY PRODUCTS OF CALIFORNIA FOR THE YEAR 1930—Continued

### Canned—Continued

| Kind of fish | Size of cans | Northern California district, cases | Monterey district, cases | San Pedro district, cases | San Diego district, cases | Total cases |
|---|---|---|---|---|---|---|
| Yellowtail | 1-lb. | | | 8,764 | 2,549 | 11,313 |
| | ½-lb. | | | 6,749 | 79 | 6,828 |
| | ¼-lb. (100 to case) | | | 992 | 2,210 | 3,202 |
| Miscellaneous (scrap) | 1-lb. tall | | | | 20 | 20 |
| | ½-lb. | | | | 276 | 276 |
| Totals | | 15,411 | 1,844,279 | 2,266,182 | 1,033,367 | 5,159,239 |

### Salted, Smoked and Dried

| Kind of fish | Size or quantity | Northern California district | Monterey district | San Pedro district | San Diego district | Total |
|---|---|---|---|---|---|---|
| Mackerel, smoked | Pounds | | | 48,474 | | 48,474 |
| Mixed fish, dried | Pounds | 77,876 | | | | 77,876 |
| Mixed fish, salted | Pounds | | | | 279,938 | 279,938 |
| Sablefish, smoked | Pounds | 303,477 | | | | 303,477 |
| Salacchini | 100-lb. cases | | 34 | | | 34 |
| Salacchini | 50-lb. boxes | | 26 | | | 26 |
| Salmon, mild cured | Tierces | 1,260 | | | | 1,260 |
| Salmon, salted | 200-lb. bbls. | 44 | | | | 44 |
| Salmon, salted | 100-lb. bbls. | 4 | | | | 4 |
| Salmon, smoked | Pounds | 97,047 | | | | 97,047 |
| Sardines, salted | 280-lb. bbls. | | 60 | | | 60 |
| Sardines, salted | 100-lb. bbls. | | 25 | | | 25 |
| Sardines, salted | 25-lb. kits | | 814 | | | 814 |
| Sardines, smoked | Pounds | 1,100 | | | | 1,100 |
| Shrimps, dried | Pounds | 146,842 | | | | 146,842 |
| Shrimp meal | Pounds | 272,106 | | | | 272,106 |
| Squid, dried | Pounds | 1,383,660 | | | | 1,383,660 |
| Fish flour | Tons | | 637 | | | 637 |
| Fish meal | Tons | 896 | 16,231 | 13,653 | 4,859 | 35,639 |
| Fish oil | Gallons | 19,431 | 4,498,450 | 1,282,893 | 41,989 | 5,842,763 |
| **Miscellaneous Data** | | | | | | |
| Estimated value of pack | | $1,787,654 | $6,002,661 | $11,140,122 | $7,351,781 | $26,282,218 |
| Number of employees | | 509 | 2,503 | 3,192 | 1,415 | 7,619 |
| Value of plants | | $745,000 | $3,428,889 | $4,696,585 | $1,142,389 | $10,012,863 |

NOTE:—Sardines packed and fish meal and oil produced at Pittsburg included with Monterey.

## REPORT OF SARDINE CANNERIES, SEASON 1930–31

Sardine canning operations were started in Monterey on the opening of the season August 1, 1930, with small deliveries during the first half of the month. In the San Pedro district, where the season starts November 1, six plants received small quantities of sardines in the opening month. Among these six plants were included one plant located at Hueneme and the floating cannery "S. S. Calmex," operating out of Los Angeles harbor, under state supervision and inspection. All plants in Monterey and northern California ceased operations on or before February 15, 1931, and in the San Pedro district all plants finished on sardines March 31. One plant operated in northern California and its output is included with the Monterey district. The output of the plant at Hueneme and of the floating cannery "S. S. Calmex" is included with the production of the San Pedro district. No 1-lb. ovals were packed in the San Diego district during the period covered by this report.

In past reports, in figuring amount of offal from cannery operations, we have used a basis of 33⅓ per cent of the fish used for canning as offal, but, realizing this percentage was too low and the proper amount was slightly higher than 50 per cent in most cases, we adopted at the opening of the past season a new method of arriving at the amount of offal by figuring 50 per cent of the amount of fish used in canning as offal. This change will account for the increase in amount of offal shown in the report below. The basis adopted for the past season will be continued and will give a more accurate report of the amount of material used to produce a ton of meal, and the number of gallons of oil produced from each ton of offal and fish used in a reduction plant.

### CANNERY, FISH FLOUR, MEAL AND OIL PRODUCTION

August 1, 1930, to March 31, 1931

| District | Tons of sardines received | Tons used for canning | Tons used for meal and flour | Tons offal |
|---|---|---|---|---|
| Monterey | 133,421 | 79,124 | 54,240 | 39,578 |
| San Pedro | 38,580 | 28,668 | 8,897 | 13,990 |
| Totals | 172,001 | 107,792 | 64,137 | 53,568 |
| Deduct fish used for other purposes | 16,722 | | | |
| Fish used by canning plants | 155,279 | | | |

| District | Cases 1-lb. ovals packed | Cases other size cans packed | Other size cans equivalent to cases 1-lb. ovals | Cases per ton |
|---|---|---|---|---|
| Monterey | 1,336,225 | 248,491 | 246,316 | 13.5 |
| San Pedro | 403,041 | 167,631 | 170,388 | 14.8 |
| Totals | 1,739,266 | 416,122 | 416,704 | |

| District | Fish flour, tons | Meal, tons | Ratio per ton of meal | Oil, gallons | Gallons oil per ton of fish and offal | Tons of fish used for other purposes |
|---|---|---|---|---|---|---|
| Monterey | 600 | 14,206 | 6 3 | 4,127,555 | 43 4 | [1]16,722 |
| San Pedro | | 4,317 | 5 5 | 630,011 | 26 3 | |
| Totals | 600 | 18,523 | | 4,757,566 | | 16,722 |

[1] 9933 tons used for fish flour, 6704 tons used for edible oil, 85 tons for salting.

## SARDINE CATCH IN TONS BY MONTHS DURING SEASON, 1930-31

| | Monterey and northern California | San Pedro |
|---|---|---|
| August, 1930 | 14,931 | |
| September | 21,620 | |
| October | 33,830 | |
| November | 18,819 | 5,809 |
| December | 10,898 | 2,576 |
| January, 1931 | 15,419 | 6,610 |
| February | 17,904 | 13,275 |
| March | | 10,310 |
| Totals | 133,421 | 38,580 |

## CASE PACK OF 1-LB. OVALS BY MONTHS DURING SEASON 1930-31

| | Monterey and northern California | San Pedro |
|---|---|---|
| August, 1930 | 149,369 | |
| September | 243,552 | |
| October | 395,069 | |
| November | 194,828 | 40,854 |
| December | 64,795 | 29,360 |
| January, 1931 | 143,591 | 65,133 |
| February | 145,021 | 139,843 |
| March | | 127,851 |
| Totals | 1,336,225 | 403,041 |

## SARDINE MEAL PRODUCTION IN TONS BY MONTHS, SEASON 1930-31

| | Monterey and northern California | San Pedro |
|---|---|---|
| August, 1930 | 1,446 | |
| September | 2,106 | |
| October | 3,457 | |
| November | 1,975 | 630 |
| December | 1,425 | 291 |
| January, 1931 | 1,726 | 785 |
| February | 2,071 | 1,527 |
| March | | 1,084 |
| Totals | 14,206 | 4,317 |

## SARDINE OIL PRODUCTION IN GALLONS BY MONTHS, SEASON 1930-31

| | Monterey and northern California | San Pedro |
|---|---|---|
| August, 1930 | 448,853 | ---------- |
| September | 623,051 | ---------- |
| October | 1,007,921 | ---------- |
| November | 625,676 | 98,645 |
| December | 419,124 | 38,557 |
| January, 1931 | 490,186 | 103,613 |
| February | 512,744 | 265,595 |
| March | ---------- | 123,601 |
| Totals | 4,127,555 | 630,011 |

## COMPARATIVE STATEMENT OF SARDINE CANNERY PRODUCTION, SEASONS 1929-30 AND 1930-31

### Monterey District

| | Season 1929-30 | Season 1930-31 | Decrease 1930-31 | Percentage decrease |
|---|---|---|---|---|
| Tons of sardines received | 180,089 | 133,421 | 46,668 | 25.9 |
| Tons of sardines used for canning | 108,674 | 79,124 | 29,550 | 27.2 |
| Tons of sardines used for meal, flour and oil | 71,351 | 54,240 | 17,111 | 24.0 |
| Tons offal | 36,237 | 39,578 | *3,341 | *9.2 |
| Cases 1-lb. ovals packed | 2,004,044 | 1,336,225 | 667,819 | 33.3 |
| Cases other size cans packed | 167,036 | 248,491 | *81,455 | *48.7 |
| Other size cans equivalent to cases 1-lb. ovals | 169,462 | 246,316 | *76,854 | *45.3 |
| Meal, tons | 18,953 | 14,206 | 4,747 | 25.0 |
| Oil, gallons | 4,362,002 | 4,127,555 | 234,447 | 5.3 |
| Tons used for oil, flour and salting | 24,508 | 16,722 | 7,786 | 31.7 |

### San Pedro District

| | Season 1929-30 | Season 1930-31 | Decrease 1930-31 | Percentage decrease |
|---|---|---|---|---|
| Tons of sardines received | 140,432 | 38,580 | 101,852 | 264.0 |
| Tons of sardines used for canning | 97,602 | 28,668 | 68,934 | 240.0 |
| Tons of sardines used for meal | 42,830 | 9,897 | 32,933 | 332.7 |
| Tons of offal | 32,532 | 13,990 | 18,542 | 132.5 |
| Cases 1-lb. ovals packed | 1,493,615 | 403,041 | 1,090,574 | 270.5 |
| Cases other size cans packed | 461,535 | 167,631 | 293,904 | 175.3 |
| Other size cans equivalent to cases 1-lb. ovals | 458,416 | 170,388 | 288,027 | 169.0 |
| Meal, tons | 16,258 | 4,317 | 11,941 | 276.6 |
| Oil, gallons | 1,986,704 | 630,011 | 1,356,693 | 215.3 |

* Increase.

SARDINE PLANTS OPERATED, SEASON 1930-31

| | |
|---|---|
| F. E. Booth Company, Inc. | Pittsburg |
| Bayside Fish Flour Company | Monterey |
| F. E. Booth Company, Inc. | Monterey |
| California Packing Corporation | Monterey |
| Carmel Canning Company | Monterey |
| Custom House Packing Corporation | Monterey |
| Del Mar Canning Corporation | Monterey |
| Globe Grain and Milling Company | Monterey |
| E. B. Gross Canning Company | Monterey |
| K. Hovden Company | Monterey |
| Monterey Canning Company | Monterey |
| San Carlos Canning Company | Monterey |
| San Xavier Fish Packing Company | Monterey |
| Sea Pride Packing Corporation, Ltd. | Monterey |
| Marine Products Co., S. S. "Calmex" | Los Angeles Harbor |
| Boyd Packing Co. | Hueneme |
| California Packing Corporation | Terminal Island |
| Coast Fishing Company | Wilmington |
| French Sardine Company, Inc. | Terminal Island |
| General Fisheries Corporation | San Pedro |
| Italian Food Products Company, Inc. | Long Beach |
| Southern California Fish Corporation | Terminal Island |
| Van Camp Sea Food Company, Inc. | Terminal Island |

## CALIFORNIA FRESH FISHERY PRODUCTS FOR THE YEAR 1931

| Species of fish | Del Norte, Humboldt | Mendocino, Sonoma, Lake | Marin | Solano, Yolo | Sacramento, San Joaquin | Alameda, Contra Costa | San Francisco, San Mateo | Santa Cruz | Monterey |
|---|---|---|---|---|---|---|---|---|---|
| Albacore | | | | | | | 7 | | 30,080 |
| Anchovies | | | | | | | 164,657 | 50 | 112,140 |
| Barracuda | | | | | | | 8,270 | 37,076 | 107,412 |
| Bonito | | | | | | | | 1,962 | 10,137 |
| Carp | | 3,517 | | 7,970 | 12,174 | 13,099 | | | |
| Catfish | | 39,274 | | 1,786 | 217,620 | 91,440 | | | |
| Cultus Cod | 715,965 | 32,191 | | | | | 299,009 | 18,601 | 115,792 |
| Dolphin | | | | | | | | | |
| Eels | | | | | | | 40 | | |
| Flounders | 114,765 | 13,260 | | 27 | 6 | 587 | 39,357 | 1,378 | 174 |
| Grayfish | 20,015 | 1,890 | | | 12 | | 93,875 | 4,162 | 992 |
| Hake | 670 | | | | | | 11,936 | | |
| Halibut | 774,879 | 12,800 | 254 | | | | 5,531 | 3,849 | 12,889 |
| Hardhead | | 14,395 | | | 31,547 | | | | |
| Herring | 17,819 | | 281,852 | | | 4,778 | 348,440 | | 16,236 |
| Kingfish | | | | | | | 4,358 | 11,009 | 130,020 |
| Mackerel | | | | | | 62 | 2,169 | 15,692 | 1,209,236 |
| Mackerel—Horse | | | | | | | | | 248,921 |
| Mackerel—Spanish | | | | | | | | | |
| Mullet | | | | | | | | | |
| Perch | 21,025 | 40 | 44,910 | | | 42 | 48,609 | 3,365 | 38,630 |
| Pike | | | | 238 | 1,331 | 930 | | | |
| Pompano | | | | | | | 20 | 57 | 676 |
| Rock Bass | | | | | | | | | |
| Rockfish | 446,783 | 17,629 | | | | 27 | 646,458 | 753,643 | 1,811,464 |
| Sablefish | 675,411 | 28,100 | | | | | 67,010 | 231,446 | 18,223 |
| Salmon | 2,972,645 | 968,266 | | 164,186 | 284,320 | 501,344 | 428,298 | 69,103 | 22,368 |
| Sandabs | 285,192 | 12,815 | | | | | 106,736 | 49,079 | 8,093 |
| Sardines | | | | | | | 50,684,684 | 16,206 | 152,598,347 |
| Sculpin | | | | | | | 585 | 300 | |
| Sea Bass—Black | | | | | | | | | 25 |
| Sea Bass—White | | | 9,817 | | | | 11,343 | 28,521 | 11,622 |
| Shad | | | | 829 | 20,866 | 4,259 | 95,914 | | |
| Shad—Buck | | | | 16,929 | 19,217 | 106,677 | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Shad—Roe | | | | 91,457 | 45,434 | 468,848 | 95 | | |
| Sheepshead | | | | | | | | | |
| Skates | 36,026 | 265 | | | | | 88,728 | 7,090 | 6,416 |
| Skipjack | | | | | | | | | |
| Smelt | 101,945 | 1,962 | 44,061 | | | 564 | 189,338 | 116,281 | 250,449 |
| Sole | 7,232,206 | 90,320 | | | | | 1,195,277 | 449,098 | 85,617 |
| Splittail | | | | | 6,112 | 2,919 | | | |
| Striped Bass | 203 | | 2,165 | 68,008 | 158,012 | 672,753 | 59,657 | | |
| Sting Ray | | | | | | | 150 | | |
| Suckers | | | | | 567 | | | | |
| Swordfish | | | | | | | | | |
| Tomcod | 2,465 | | | | | | 1,334 | | |
| Tuna—Bluefin | | | | | | | | | |
| Tuna—Yellowfin | | | | | | | | | |
| Turbot | 4,387 | | 1,676 | | | | 12,277 | | |
| Whitebait | 85,237 | 42,185 | 4,526 | | 427 | | 7,868 | | [5] 1,758 |
| Whitefish | | | | | | | | | |
| Yellowtail | | | | | | | | | |
| Miscellaneous | 27,087 | 449 | | 6 | 588 | 680 | 4,171 | 878 | 3,480 |
| Total fish | 13,534,725 | 1,279,358 | 389,261 | 351,436 | 798,233 | 1,869,009 | 54,626,201 | 1,818,846 | 156,851,197 |
| Crustaceans: | | | | | | | | | |
| Crabs | [1] 112,044 | [2] 326 | [3] 2,064 | | | | [4] 2,109,455 | [5] 4,248 | |
| Shrimps | | | 802,390 | | | 6,440 | 873,950 | | 3,970 |
| Spiny Lobsters | | | | | | | | | |
| Mollusks: | | | | | | | | | |
| Abalones | | | | | | | | | 3,164,125 |
| Clams—Cockle | 275 | 598 | 111,648 | | | | | | |
| Clams—Mixed | 22,865 | 465 | | | | | 79 | | |
| Clams—Pismo | | | | | | | | 1,522 | 14,841 |
| Clams—Softshell | 302 | 219 | 80,280 | | | 18,820 | 20,707 | | |
| Cuttlefish | 80 | 1,932 | | | | | 3,772 | 1,207 | 55,448 |
| Mussels | 1,050 | | | | | | | | 200 |
| Oysters—Eastern | | | 169,375 | | | | 259,180 | | |
| Oysters—Native | 64,269 | | 30,897 | | | | 83,250 | | |
| Squid | | | | | | | | 22,300 | 1,680,692 |
| Miscellaneous: | | | | | | | | | |
| Terrapins | | 660 | | | | | | | |
| Turtles | | | | | | | | | |
| Totals | 13,736,210 | 1,283,558 | 1,585,915 | 351,436 | 798,233 | 1,894,269 | 57,976,594 | 1,848,123 | 161,770,473 |

All amounts shown in pounds unless otherwise specified. Skipjack and Albacore cleaned.

[1] 4,668½ dozen.
[2] 13 7-12 dozen.
[3] 86 dozen.
[4] 87,894 dozen.
[5] 177 dozen.

CALIFORNIA FRESH FISHERY PRODUCTS FOR THE YEAR 1931—Continued

| Species of fish | San Luis Obispo, Santa Barbara, Ventura | Los Angeles | Orange | San Diego, Imperial | Total | Fish from south of the International Boundary brought into San Pedro | Fish from south of the International Boundary brought into San Diego | Total fish from south of the International Boundary brought into California |
|---|---|---|---|---|---|---|---|---|
| Albacore | | 7,214 | 21 | | 37,322 | | | |
| Anchovies | | 36,755 | 840 | 240 | 314,682 | | | |
| Barracuda | 3,645 | 2,063,713 | 25,728 | 1,105,940 | 3,351,784 | 638,727 | 175,028 | 813,755 |
| Bonito | 114,011 | 2,630,845 | 10,768 | 224,694 | 2,992,417 | 84,461 | 982 | 85,443 |
| Carp | | 36,740 | 12 | | 73,512 | | | |
| Catfish | | | | | 350,120 | | | |
| Cultus Cod | 163 | 3,237 | 35 | | 1,184,993 | | | |
| Dolphin | | 151 | 347 | | 498 | | | |
| Eels | | 100 | | | 140 | | | |
| Flounders | 57 | 1,706 | 37 | | 171,354 | | | |
| Grayfish | 1,388 | 192,864 | 94,378 | 180,216 | 589,792 | 25 | 3,345 | 3,370 |
| Hake | | 285 | | | 12,891 | | | |
| Halibut | 356,346 | 436,620 | 30,931 | 90,707 | 1,724,806 | 1,634 | 34,651 | 36,285 |
| Hardhead | | | | | 45,942 | | | |
| Herring | 242 | | | 17,593 | 686,960 | | | |
| Kingfish | 18 | 262,463 | 2,269 | 1,465 | 411,602 | | | |
| Mackerel | 38,096 | 12,554,901 | 187,232 | 212,941 | 14,220,329 | | | |
| Mackerel—Horse | | 313,822 | 160 | | 562,903 | | | |
| Mackerel—Spanish | | | | | | 18,933 | 5,196 | 24,129 |
| Mullet | | 2,799 | 5,551 | 8,845 | 17,195 | 4,235 | 2,618 | 6,853 |
| Perch | 4,878 | 86,546 | 695 | 333 | 249,073 | | | |
| Pike | | | | | 2,499 | | | |
| Pompano | | 3,903 | 54 | 615 | 5,325 | | 738 | 738 |
| Rock Bass | 21,918 | 252,974 | 59,389 | 171,063 | 505,344 | 20,516 | 12,567 | 33,083 |
| Rockfish | 65,326 | 2,574,399 | 44,481 | 880,182 | 7,240,392 | 1,274 | 1,515 | 2,789 |
| Sablefish | | 18,782 | 417 | | 1,039,389 | | | |
| Salmon | | | | | 5,410,530 | | | |
| Sandabs | | 8,794 | 1,015 | | 471,724 | | | |
| Sardines | 1,437,605 | 95,979,748 | 1,770 | 132,167 | 300,850,527 | | | |
| Sculpin | 10 | 72,177 | 6,692 | 12,415 | 92,179 | | 30 | 30 |
| Sea Bass—Black | 5,394 | 80,358 | 27,054 | 146,524 | 259,355 | 95,399 | 125,119 | 220,518 |
| Sea Bass—White | 51,320 | 718,205 | 4,599 | 210,213 | 1,045,640 | 137,173 | 202,438 | 339,611 |
| Shad | | | | | 121,868 | | | |
| Shad—Buck | | | | | 142,823 | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Shad—Roe | | | | | 605,834 | | | |
| Sheepshead | 11,837 | 159,611 | 1,295 | 25,611 | 198,354 | | 1,290 | 1,290 |
| Skates | | 30,849 | 2,901 | 1,572 | 173,847 | | | |
| Skipjack | 20 | 7,662,291 | 54,812 | 4,338,793 | 12,055,916 | 2,086,839 | 2,355,856 | 4,442,695 |
| Smelt | 29,848 | 298,374 | 58,134 | 16,605 | 1,107,561 | 88 | 9 | 97 |
| Sole | 249,127 | 65,864 | 1,207 | 2,097 | 9,370,813 | | | |
| Splittail | | | | | 9,031 | | | |
| Striped Bass | | | | | 960,798 | | | |
| Sting Ray | | 287 | | | 437 | | | |
| Suckers | | | | | 567 | | | |
| Swordfish | | 234,580 | 921 | 145,983 | 381,484 | 365 | | 365 |
| Tomcod | | | | | 3,799 | | | |
| Tuna—Bluefin | | 2,353,607 | | 3,168 | 2,356,775 | 1,168,263 | 7,511 | 1,175,774 |
| Tuna—Yellowfin | | 674,755 | 75 | 56,052 | 730,882 | 12,416,902 | 23,402,973 | 35,819,875 |
| Turbot | | | | | 18,340 | | | |
| Whitebait | | | | | 142,001 | | | |
| Whitefish | 10 | 97,763 | 1,694 | 107,169 | 206,636 | 9,925 | 2,554 | 12,479 |
| Yellowtail | 1,990 | 712,421 | 15,622 | 947,200 | 1,677,233 | 462,447 | 383,933 | 846,380 |
| Miscellaneous | 3,587 | 230,019 | 911 | 6,824 | 278,680 | 108,338 | 148,342 | 256,680 |
| Total fish | 2,396,836 | 130,860,522 | 642,047 | 9,047,227 | 374,464,898 | 17,255,544 | 26,866,695 | 44,122,239 |
| Crustaceans: | | | | | | | | |
| Crabs | | [a]50 | | | [b]2,228,187 | | | |
| Shrimps | | | | | 1,686,750 | | | |
| Spiny Lobsters | 62,128 | 174,250 | 12,973 | 134,424 | 383,775 | 5,953 | 956,381 | 962,334 |
| Mollusks: | | | | | | | | |
| Abalones | 97,432 | | | | 3,261,557 | | | |
| Clams—Cockle | | 35,218 | | | 147,839 | | | |
| Clams—Mixed | | 8,859 | | | 32,268 | | | |
| Clams—Pismo | 88,074 | | | | 104,437 | | | |
| Clams—Softshell | | | | | 120,328 | | | |
| Cuttlefish | | 241 | 59 | | 62,739 | | | |
| Mussels | | | | | 1,850 | | | |
| Oysters—Eastern | | | | | 428,555 | | | |
| Oysters—Native | | | | | 178,416 | | | |
| Squid | 70 | 30,540 | | | 1,733,602 | | | |
| Miscellaneous: | | | | | | | | |
| Terrapins | | | | | 660 | | | |
| Turtles | | | | | | | 6,657 | 6,657 |
| Totals | 2,644,540 | 131,109,780 | 655,079 | 9,181,651 | 384,835,861 | 17,261,497 | 27,829,733 | 45,091,230 |

[a] 2 1-12 dozen.
[b] 92,841 2-12 dozen.

## CANNED, CURED AND MANUFACTURED FISHERY PRODUCTS OF CALIFORNIA FOR THE YEAR 1931

### Canned

| Kind of fish | Size of cans | Northern California district, cases | Monterey district, cases | San Pedro district, cases | San Diego district, cases | Total cases |
|---|---|---|---|---|---|---|
| Abalone | 1-lb. | | 307 | | | 307 |
| | ½-lb. | | 15 | | | 15 |
| Albacore | 4-lb. (12 to case) | | | 962 | | 962 |
| | 1-lb. | | | 15,407 | | 15,407 |
| | ½-lb. | | | 118,545 | 177 | 118,722 |
| | ½-lb. (24 to case) | | | 5,131 | | 5,131 |
| | ¼-lb. | | | 3,612 | | 3,612 |
| | ¼-lb. (96 to case) | | | 634 | | 634 |
| | ⅛-lb. (96 to case) | | | 505 | | 505 |
| Bonito | 1-lb. | | | 15,800 | 924 | 16,724 |
| | ½-lb. | | | 11,425 | 1,333 | 12,758 |
| | ¼-lb. | | | 222 | | 222 |
| | ¼-lb. (100 to case) | | | 8,550 | | 8,550 |
| Fish cake | ¾-lb. | | | 2,821 | | 2,821 |
| Mackerel | 1-lb. tall | | | 100,912 | 305 | 101,217 |
| Salmon | 1-lb. flat | 1,257 | | | | 1,257 |
| | ½-lb. flat | 12,813 | | | | 12,813 |
| Sardines | 10-lb. (6 to case) | | 337 | | | 337 |
| | 1-lb. oval | | 1,004,215 | 498,996 | | 1,503,211 |
| | 1-lb. tall | | 43,722 | 59,853 | | 103,575 |
| | 13-oz. | | | 1,467 | | 1,467 |
| | ½-lb. oval | | 11,280 | 11,931 | | 23,211 |
| | 5-oz. tall | | 40,375 | 119,390 | | 159,765 |
| | ½-lb. square | | | | 66 | 66 |
| | ¼-lb. square | | | | 3,312 | 3,312 |
| | 6-oz. square | | | | 47 | 47 |
| Shad roe | ½-lb. oval | 1,712 | | | | 1,712 |
| Squid | 1-lb. | | 13,100 | | | 13,100 |
| | 7-oz. | | 6,727 | | | 6,727 |
| Tonno | ½-lb. | | | 2,485 | 706 | 3,191 |
| | ¼-lb. (100 to case) | | | 33,029 | | 33,029 |
| Tuna, Bluefin | 4-lb. (12 to case) | | | 275 | | 275 |
| | 1-lb. | | | 4,122 | | 4,122 |
| | ½-lb. | | | 28,509 | | 28,509 |
| | ¼-lb. | | | 1,386 | | 1,386 |
| | ¼-lb. (100 to case) | | | 12,170 | | 12,170 |
| Tuna, striped | 1-lb. | | | 10,274 | 6,096 | 16,370 |
| | ½-lb. | | | 120,832 | 89,827 | 210,659 |
| | ¼-lb. | | | 10,884 | 12,269 | 23,153 |
| | ¼-lb. (100 to case) | | | 24,101 | 4,115 | 28,216 |
| Tuna, yellowfin | 4-lb. (12 to case) | | | 1,832 | | 1,832 |
| | 1-lb. | | | 19,627 | 36,541 | 56,168 |
| | ½-lb. | | | 132,331 | 299,548 | 431,879 |
| | ¼-lb. | | | 21,939 | 85,705 | 107,644 |
| | ¼-lb. (100 to case) | | | 6,386 | 9,435 | 15,821 |
| Tuna flakes | 1-lb. | | | 2,269 | 1,642 | 3,911 |
| | ½-lb | | | 9,210 | 4,283 | 13,493 |
| | ¼-lb. | | | 1,371 | 666 | 2,037 |
| Yellowtail | 1-lb. | | | 492 | 749 | 1,241 |
| | ½-lb. | | | 446 | | 446 |
| | ¼-lb. (100 to case) | | | 354 | | 354 |
| Dog and cat food | 10-lb. (6 to case) | | | 6,325 | | 6,325 |
| | 1-lb. | | | 38,004 | | 38,004 |
| | ¼-lb. (100 to case) | | | 43 | | 43 |
| Totals | | 15,782 | 1,120,078 | 1,464,859 | 557,746 | 3,158,465 |

## CANNED, CURED AND MANUFACTURED FISHERY PRODUCTS OF CALIFORNIA FOR THE YEAR 1931

### Salted, Smoked and Dried

| Kind of fish | Size or quantity | Northern California district | Monterey district | San Pedro district | San Diego district | Total |
|---|---|---|---|---|---|---|
| Anchovy, salted | Pounds | 3,690 | 3,200 | | | 6,890 |
| Herring, Bismark | 10-lb. pails | 475 | | | | 475 |
| Mackerel, salted | Pounds | 950 | | 612 | | 1,562 |
| Mackerel, smoked | Pounds | | | 43,984 | | 43,984 |
| Mixed fish, dried | Pounds | 66,538 | | | | 66,538 |
| Mixed fish, salted | Pounds | | | | 135,103 | 135,103 |
| Rollmops | 10-lb. kits | 635 | | | | 635 |
| Sablefish, smoked | Pounds | 274,049 | | | | 274,049 |
| Salmon, mild cured | Tierces | 1,114 | | | | 1,114 |
| Salmon, salted | Pounds | 1,500 | | | | 1,500 |
| Salmon, smoked | Pounds | 85,798 | | | | 85,798 |
| Sardines, salted | Pounds | | 187,944 | | | 187,944 |
| Sardines, smoked | Pounds | 12,997 | | | | 12,997 |
| Shad, mild cured | Tierces | 10 | | | | 10 |
| Shrimp, dried | Pounds | 74,919 | | | | 74,919 |
| Shrimp, meal | Pounds | 131,531 | | | | 131,531 |
| Fish flour | Tons | | 599 | | | 599 |
| Fish meal | Tons | 940 | 11,073 | 7,600 | 2,827 | 22,440 |
| Fish oil | Gallons | 13,186 | 3,085,631 | 818,364 | 7,511 | 3,924,692 |

### Miscellaneous data

| | | | | | | |
|---|---|---|---|---|---|---|
| Estimated value of pack | | $458,C24 | $3,822,290 | $5,964,017 | $3,550,855 | $13,795,186 |
| Number of employees | | 535 | 1,733 | 2,966 | 1,545 | 6,779 |
| Value of plants | | $817,260 | $3,028,397 | $4,608,628 | $1,019,819 | $9,474,104 |

NOTE.—Sardines packed and fish meal and oil produced at Pittsburg included with Monterey.

## REPORT OF SARDINE CANNERIES, SEASON 1931–32

The season of 1931–32 opened in Monterey on August 1st, but no fish were brought in until August 13th, when a delivery of 18 tons was made to one plant. During August, five plants were the maximum number receiving fish during any one day. At Pittsburg, the first fish were received on August 19th. Deliveries were light at both Monterey and Pittsburg during August, with total receipts of 4097 tons for the month. In the San Pedro district, the first fish were delivered on November 3d, and light deliveries continued throughout the month, with a total of 4061 tons in November. The floating cannery, *S. S. Calmex,* of Mexican registry, operated in Monterey Bay during September and October, under State supervision and inspection, but left for southern California during the full moon period the latter part of October, and has not been operating since that time. The production of this floating cannery and the plant of the F. E. Booth Co. at Pittsburg is included with the Monterery records. One plant operated at Hueneme during November, and the production of that plant is included with the San Pedro district records. No 1-lb. ovals were packed in the San Diego district.

### CANNERY, FISH FLOUR, MEAL AND OIL PRODUCTION

August 1, 1931, to March 31, 1932

| District | Sardines received, tons | Used for canning, tons | Used for meal and flour, tons | Offal, tons |
|---|---|---|---|---|
| Monterey and Northern California | 88,763 | 52,117 | 36,608 | 26,067 |
| San Pedro | 42,557 | 31,485 | 10,981 | 15,742 |
| Totals | 131,320 | 83,602 | 47,589 | 41,809 |
| Deduct fish used for other purposes | 15,979 | | | |
| Fish used by canning plants | 115,341 | | | |

| District | 1-lb. ovals packed, cases | Other size cans packed, cases | Other size cans equivalent to 1-lb. ovals, cases | Cases per ton |
|---|---|---|---|---|
| Monterey and Northern California | 990,104 | 50,892 | 52,197 | 14.3 |
| San Pedro | 470,796 | 159,593 | 159,066 | 14.5 |
| Totals | 1,460,900 | 210,485 | 211,263 | |

| District | Fish flour, tons | Meal, tons | Ratio per ton of meal | Oil, gallons | Gallons oil per ton of fish and offal | Fish used for other purposes, tons |
|---|---|---|---|---|---|---|
| Monterey and Northern Cal. | 485 | 10,128 | 5.9 | 2,755,282 | 43.9 | [1]15,888 |
| San Pedro | | 4,911 | 5.4 | 762,701 | 28.5 | [2]91 |
| Totals | 485 | 15,039 | | 3,517,983 | | 15,979 |

[1] 7,829 tons used for fish flour, 7,956 tons used for edible oil, 53 tons for experimental purposes, 50 tons for salting.
[2] 91 tons used for manufacture of cat and dog food.

SARDINE CATCH IN TONS BY MONTHS DURING SEASON 1931-32

| | Monterey and Northern California | San Pedro |
|---|---|---|
| August, 1931 | 4,097 | |
| September | 16,327 | |
| October | 15,961 | |
| November | 17,460 | 4,061 |
| December | 12,740 | 14,356 |
| January, 1932 | 16,691 | 6,082 |
| February | 5,487 | 12,650 |
| March | | 5,408 |
| Totals | 88,763 | 42,557 |

CASE PACK OF 1-Lb. OVALS BY MONTHS DURING SEASON 1931-32

| | Monterey and Northern California | San Pedro |
|---|---|---|
| August, 1931 | 48,819 | |
| September | 195,821 | |
| October | 174,894 | |
| November | 173,725 | 39,165 |
| December | 145,127 | 139,046 |
| January, 1932 | 185,116 | 70,327 |
| February | 66,602 | 156,098 |
| March | | 66,160 |
| Totals | 990,104 | 470,796 |

SARDINE MEAL PRODUCTION IN TONS BY MONTHS, SEASON 1931-32

| | Monterey and Northern California | San Pedro |
|---|---|---|
| August, 1931 | 407 | |
| September | 1,649 | |
| October | 1,768 | |
| November | 2,095 | 421 |
| December | 1,593 | 1,714 |
| January, 1932 | 2,016 | 726 |
| February | 600 | 1,381 |
| March | | 669 |
| Totals | 10,128 | 4,911 |

SARDINE OIL PRODUCTION IN GALLONS BY MONTHS, SEASON 1931-32

| | Monterey and Northern California | San Pedro |
|---|---|---|
| August, 1931 | 123,571 | |
| September | 504,658 | |
| October | 519,705 | |
| November | 553,388 | 65,267 |
| December | 414,501 | 331,878 |
| January, 1932 | 504,658 | 110,582 |
| February | 134,801 | 182,100 |
| March | | 72,874 |
| Totals | 2,755,282 | 762,701 |

## COMPARATIVE STATEMENT OF SARDINE CANNERY PRODUCTION, SEASONS 1930-31 AND 1931-32

### Monterey and Northern California District

| | Season 1930-31 | Season 1931-32 | Increase 1931-32 | Percentage increase |
|---|---|---|---|---|
| Tons of sardines received | 133,421 | 88,763 | *44,658 | *33.4 |
| Tons of sardines used for canning | 79,124 | 52,117 | *27,007 | *34.1 |
| Tons of sardines used for meal, flour and oil | 54,240 | 36,608 | *17,632 | *32.5 |
| Tons offal | 39,578 | 26,067 | *13,511 | *34.1 |
| Cases 1-lb. ovals packed | 1,336,225 | 990,104 | *346,121 | *25.9 |
| Cases other size cans packed | 248,491 | 50,892 | *197,599 | *79.5 |
| Cases other size cans equivalent to cases 1-lb. ovals | 246,316 | 52,197 | *194,119 | *78.8 |
| Meal, tons | 14,206 | 10,128 | *4,078 | *28.7 |
| Oil, gallons | 4,127,555 | 2,755,282 | *1,372,273 | *33.2 |
| Tons used for oil, flour and salting | 16,722 | 15,888 | *834 | *5.0 |

* Decrease.

### San Pedro District

| | Season 1930-31 | Season 1931-32 | Increase 1931-32 | Percentage increase |
|---|---|---|---|---|
| Tons of sardines received | 38,580 | 42,557 | 3,977 | 10.3 |
| Tons of sardines used for canning | 28,668 | 31,485 | 2,817 | 9.8 |
| Tons of sardines used for meal | 9,897 | 10,981 | 1,084 | 10.9 |
| Tons of offal | 13,990 | 15,742 | 1,752 | 12.5 |
| Cases 1-lb. ovals packed | 403,041 | 470,796 | 67,755 | 16.8 |
| Cases other size cans packed | 167,631 | 159,593 | *8,038 | *4.7 |
| Cases other size cans equivalent to 1-lb. ovals | 170,388 | 159,066 | *11,322 | *6.6 |
| Meal, tons | 4,317 | 4,911 | 594 | 13.7 |
| Oil, gallons | 630,011 | 762,701 | 132,690 | 21.0 |

* Decrease.

## SARDINE PLANTS OPERATED, SEASON 1931-32

| | |
|---|---|
| F. E. Booth Company, Inc. | Pittsburg |
| Bayside Fish Flour Company | Monterey |
| Bay View Packing Co., Ltd. | Monterey |
| F. E. Booth Company, Inc. | Monterey |
| California Packing Corporation | Monterey |
| Carmel Canning Company | Monterey |
| Custom House Packing Corporation | Monterey |
| Del Mar Canning Corporation | Monterey |
| Globe Grain and Milling Company | Monterey |
| E. B. Gross Canning Company | Monterey |
| K. Hovden Company | Monterey |
| Marine Products Co., S. S. "Calmex" | Monterey Bay |
| Monterey Canning Company | Monterey |
| Monterey Sardine Industries | Monterey |
| San Carlos Canning Company | Monterey |
| San Xavier Fish Packing Company | Monterey |
| Boyd Packing and Distributing Co., Ltd. | Hueneme |
| Coast Fishing Company | Wilmington |
| French Sardine Company, Inc. | Terminal Island |
| General Fisheries Corporation | San Pedro |
| Italian Food Products Company, Inc. | Long Beach |
| Van Camp Sea Food Company, Inc. | Terminal Island |

The following table shows case pack, meal and oil production for calendar years 1916 to 1931:

1-Lb. Ovals, Cases

| Year | Monterey and Northern California | San Pedro district | San Diego district | Total |
|---|---|---|---|---|
| 1916 | 97,100 | 2,512 | 7,133 | 106,745 |
| 1917 | 331,065 | 43,221 | 34,380 | 408,666 |
| 1918 | 593,315 | 136,632 | 17,790 | 747,737 |
| 1919 | 798,566 | 113,909 | 33,594 | 946,069 |
| 1920 | 687,777 | 213,714 | 50,302 | 951,793 |
| 1921 | 287,954 | 77,048 | 1,189 | 366,191 |
| 1922 | 353,188 | 340,860 | 3,595 | 697,643 |
| 1923 | 586,464 | 488,885 | 19,215 | 1,088,564 |
| 1924 | 631,286 | 693,133 | 12,135 | 1,336,554 |
| 1925 | 737,743 | 920,191 | 29,846 | 1,687,780 |
| 1926 | 1,158,133 | 861,088 | 63,410 | 2,082,631 |
| 1927 | 1,341,872 | 1,046,453 | 14,947 | 2,403,272 |
| 1928 | 1,511,535 | 945,676 | 39,755 | 2,496,966 |
| 1929 | 2,039,526 | 1,438,159 | 12,225 | 3,489,910 |
| 1930 | 1,579,408 | 863,254 | 15,500 | 2,458,162 |
| 1931 | 1,004,215 | 498,996 | ---------- | 1,503,211 |

Fish Meal, Tons

| Year | Monterey and Northern California | San Pedro district | San Diego district | Total |
|---|---|---|---|---|
| 1916 | 249 | 261 | 25 | 535 |
| 1917 | 875 | 2,606 | ---------- | 3,481 |
| 1918 | 2,874 | 4,737 | 1,123 | 8,734 |
| 1919 | 3,812 | 5,667 | 1,674 | 11,153 |
| 1920 | 3,969 | 3,328 | 1,559 | 8,856 |
| 1921 | 2,115 | 3,566 | 636 | 6,317 |
| 1922 | 2,695 | 5,373 | 959 | 9,027 |
| 1923 | 3,806 | 4,216 | 1,216 | 9,238 |
| 1924 | 6,601 | 7,726 | 1,001 | 15,328 |
| 1925 | 7,105 | 13,023 | 2,808 | 22,936 |
| 1926 | 7,807 | 7,066 | 1,394 | 15,767 |
| 1927 | 9,347 | 9,746 | 2,018 | 21,111 |
| 1928 | 12,575 | 12,923 | 2,367 | 27,865 |
| 1929 | 19,216 | 20,040 | 3,565 | 42,821 |
| 1930 | 17,127 | 13,653 | 4,859 | 35,639 |
| 1931 | 12,013 | 7,600 | 2,827 | 22,440 |

Includes all meal produced.

Fish Oil, Gallons

| Year | Monterey and Northern California | San Pedro district | San Diego district | Total |
|---|---|---|---|---|
| 1916 | 25,563 | ---------- | 500 | 26,063 |
| 1917 | 92,393 | 83,900 | ---------- | 176,293 |
| 1918 | 261,466 | 67,858 | 17,400 | 346,724 |
| 1919 | 341,173 | 146,298 | 26,791 | 514,262 |
| 1920 | 419,474 | 152,937 | 39,174 | 611,585 |
| 1921 | 226,826 | 93,305 | 16,607 | 336,738 |
| 1922 | 295,858 | 244,310 | 6,882 | 547,050 |
| 1923 | 576,553 | 346,883 | 28,452 | 951,888 |
| 1924 | 1,240,296 | 1,059,001 | 51,425 | 2,350,722 |
| 1925 | 1,246,561 | 1,715,633 | 187,847 | 3,150,041 |
| 1926 | 1,418,512 | 651,006 | 54,410 | 2,123,928 |
| 1927 | 1,759,480 | 763,905 | 95,105 | 2,618,490 |
| 1928 | 2,456,716 | 1,268,518 | 24,068 | 3,749,302 |
| 1929 | 4,205,118 | 2,280,991 | 62,017 | 6,548,126 |
| 1930 | 4,517,881 | 1,282,893 | 41,989 | 5,842,763 |
| 1931 | 3,098,817 | 818,364 | 7,511 | 3,924,692 |

Includes all fish oil produced.

## CASE PACK, MEAL AND OIL PRODUCTION

For Sardine Packing Seasons

### 1-Lb. Ovals, Cases

| Season | Monterey and Northern California | San Pedro district | San Diego district | Total |
|---|---|---|---|---|
| 1925-1926 | 940,906 | 968,495 | 66,074 | 1,975,475 |
| 1926-1927 | 1,202,516 | 968,858 | ---------- | 2,189,374 |
| 1927-1928 | 1,474,162 | 878,175 | 39,380 | 2,391,717 |
| 1928-1929 | 1,520,192 | 1,140,488 | 12,383 | 2,673,063 |
| 1929-1930 | 2,004,044 | 1,493,615 | 16,551 | 3,514,210 |
| 1930-1931 | 1,336,225 | 403,041 | ---------- | 1,739,266 |
| 1931-1932 | 990,104 | 470,796 | ---------- | 1,460,900 |

### Fish Meal, Tons

| Season | Monterey and Northern California | San Pedro district | San Diego district | Total |
|---|---|---|---|---|
| 1925-1926 | 6,413 | 5,962 | 467 | 12,842 |
| 1926-1927 | 6,675 | 5,962 | ---------- | 12,637 |
| 1927-1928 | 10,538 | 7,128 | 184 | 17,850 |
| 1928-1929 | 13,782 | 14,802 | 140 | 28,724 |
| 1929-1930 | 18,953 | 16,258 | 251 | 35,462 |
| 1930-1931 | 14,206 | 4,317 | ---------- | 18,523 |
| 1931-1932 | 10,128 | 4,911 | ---------- | 15,039 |

### Fish Oil, Gallons

| Season | Monterey and Northern California | San Pedro district | San Diego district | Total |
|---|---|---|---|---|
| 1925-1926 | 1,113,612 | 658,817 | 43,995 | 1,816,424 |
| 1926-1927 | 1,562,351 | 682,796 | ---------- | 2,245,147 |
| 1927-1928 | 1,859,982 | 711,579 | 10,253 | 2,581,814 |
| 1928-1929 | 2,939,579 | 2,178,815 | 6,857 | 5,125,251 |
| 1929-1930 | 4,362,002 | 1,986,704 | 11,071 | 6,359,777 |
| 1930-1931 | 4,127,555 | 630,011 | ---------- | 4,757,566 |
| 1931-1932 | 2,755,282 | 762,701 | ---------- | 3,517,983 |

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